

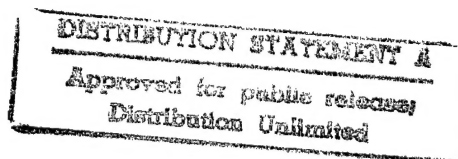
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JPRS-UCH-84-013

13 December 1984

# USSR Report

CHEMISTRY



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USSR REPORT  
CHEMISTRY

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## ADSORPTION

UDC: 541.183.7

### ADSORPTION OF HYDROGEN AND OXYGEN ON PLATINUM, ELECTROMECHANICALLY DISPERSED ON GRAPHITE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3, May-Jun 84 (manuscript received 8 Jun 83) pp 266-269

KAMYSHANOVA, G. F. and BOGDANOVSKIY, G. A., Department of General Chemistry

[Abstract] Experiments were performed on adsorption of hydrogen and oxygen on graphites containing small quantities of electrochemically precipitated platinum. Short-term electrolysis of a  $H_2PtCl_6$  solution with a graphite cathode allows the quantity of precipitated platinum to be varied within limits of a monoatomic layer. Platinum electrochemically dispersed on graphite is seen in electron-microscope pictures to be made up of three-dimensional island formations isolated by the graphite substrate, influencing the adsorption characteristics, particularly adsorption of oxygen. Judging from the shapes of the charge curves, progressive precipitation of the platinum on graphite leads to degeneration of the oxygen peak to a clearly expressed area and appearance of a new peak at lower voltage identified as the peak of desorption of hydrogen on the precipitated platinum. The presence of two hydrogen peaks on the differential charge curves indicates two forms of adsorbed hydrogen, one with low bond energy and one with high bond energy with the platinum. At small quantities of dispersed platinum there is but one energy form of adsorbed hydrogen, whereas at higher degrees of filling there are two. The relationship of these two forms of adsorbed hydrogen significantly influences the catalytic activity of the electrodes studied. Figure 1; references 4: 2 Russian, 2 Western.

[327-6508]

UDC: 541.183.5:546.791

STUDY OF ADSORPTION OF URANIUM FROM CARBONATE-CONTAINING SOLUTIONS BY INORGANIC SORBENTS, PART 8: THERMODYNAMICS OF ADSORPTION OF URANIUM ON TITANIUM-CONTAINING SORBENTS WITH DISORDERED STRUCTURE

Leningrad RADIOKHIMIYA in Russian Vol 26, No 3, May-Jun 84 (manuscript received 30 Aug 82; in final form 30 Aug 83) pp 285-288

MYASOYEDOV, B. F., NURIYEV, A. N., NOVIKOV, Yu. P., KOMAREVSKIY, V. M., MAMEDOV, R. M., SHARYGIN, L. M., GONCHAR, V. F. and MALYKH, T. G.

[Abstract] The purpose of this work was to study the thermodynamics of the process of adsorption of uranium on a specially synthesized titanium-containing adsorbent "thermoxide-5" with increased mechanical strength and highly developed specific surface. Studies were performed at pH of initial carbonate-containing uranium solutions 7.85 and 8.15, corresponding to the pH range of sea water. General semi-empirical equations were composed relating to the thermodynamic equilibrium coefficient of uranium distribution in the system to the molar ratio of uranium and titanium dioxide and the temperature. The entropy and enthalpy of the initial thermoxide-5 sorbent phase is greater than that of metatitanic acid. This effect is observed upon transition to a more disordered sorbent structure, as is achieved in the synthesis of thermoxide-5. This decreases entropy and enthalpy of the sorption reaction, changes the equilibrium constant of the reaction and the equilibrium coefficient of uranium distribution. Figures 4; references 9: 5 Russian, 4 Western.  
[331-6508]

UDC: 541.183+541.128

STUDY OF ADSORPTION OF METHANOL ON ZINC-CHROMIUM AND ZINC-CHROMIUM-POTASSIUM CATALYSTS BY THERMAL DESORPTION METHOD

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 24 Nov 82) pp 1537-1539

PLAKIDKIN, A. A., KOROBITSYNA, L. L. and YEROFYEV, V. I., Institute of Petroleum Chemistry, Tomsk, Siberian Division, USSR Academy of Sciences

[Abstract] A comparative study is performed of the adsorption of methanol on zinc-chromium and zinc-chromium-potassium catalysts by a thermal desorption method in order to study the mechanism of adsorption of methanol onto the surface of these catalysts in more detail. A catalyst with a molar  $ZnO:Cr_2O_3$  ratio of 1:0.25 was prepared by joint precipitation from nitrate solutions. Sodium carbonate was used as the precipitant. Precipitation was performed at 60°C, pH 6.4-6.8. The precipitate was washed with water, dried and heated to 400°C for 6 hours. Thermal desorption measurements were performed following adsorption of methanol at 25, 100, 150, 300 and 400°C.

Desorption products were chromatographically analyzed. It was found that addition of an alkaline additive to the zinc-chromium catalyst helps to strengthen the bond of the  $\text{CO}_2$  formed upon adsorption of methanol to the surface of the catalyst, increasing the yield of higher alcohols in the process of synthesis of methanol from  $\text{CO}$  and  $\text{H}_2$ . Figure 1; references 8: 5 Russian, 3 Western.  
[324-6508]

UDC: 541.183

NEW PHENOMENA IN ADSORPTION OF OXYGEN UNDER UNSTEADY CONDITIONS ON GOLD PROMOTED WITH SILVER ATOMS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 22 Apr 83) pp 1572-1573

KASHIN, A. V., GUTMAN, E. Ye. and MYASNIKOV, I. A., Scientific Research Physics and Chemistry Institute imeni L. Ya. Karpov, Moscow

[Abstract] The purpose of this work was to study the specifics of adsorption of molecules of oxygen on the well-studied  $\text{Au-O}_2$  and  $\text{Ag-O}_2$  systems under conditions of surface aggregation of silver atoms after atomization. A quartz resonator with gold working electrodes was used to measure adsorption of atoms of silver and molecules of oxygen. It was found that after silver atoms are atomized onto the surface of the gold the adsorption of oxygen occurs with a period of induction. There is an extreme on the curve of oxygen adsorption as a function of adsorbed silver. It is suggested that significant quantities of oxygen are not absorbed onto individual adsorbed silver atoms. The period of induction indicates that aggregation of silver atoms occurs on the surface yielding polyatomic clusters, and oxygen is adsorbed onto the surfaces of the clusters. Figures 3; references 8: 6 Russian, 2 Western.  
[324-6508]

UDC: 541.13:542.9.71.3

STUDY OF ADSORPTION OF UREA ON PLATINUM BY CHARGING CURVES METHOD

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 8 Jul 83) pp 1574-1575

MOKHAMED SEDIK KHUSSEYN EL'-DIK, YELFIMOVA, G. I. and BOGDANOVSKIY, G. A., Faculty of Chemistry, Moscow State University imeni M. V. Lomonosov

[Abstract] Experimental study is reported of the behavior of a platinized platinum electrode in solutions of 0.1 N  $\text{H}_2\text{SO}_4$  containing urea. Studies were performed at room temperature using integral and differential charging curves. Contact of urea with degassed platinum over a broad range of

volumetric concentrations causes the potential to shift in the negative direction, indicating the possibility of dehydrogenation of the urea. After the degassed surface of platinum came in contact with urea, the urea was removed from the system, the system was repeatedly washed with 0.1 n  $H_2SO_4$  and differential and charging curves were measured. The measurements indicated that the curves differed little from the background. The degree of filling of the chemisorption surface was not over 10%. There is reason to believe that in addition to chemisorption, physical adsorption also occurs. The data indicate that after contact of urea with platinum, particles of various compositions are adsorbed on the surface of the platinum. The chemisorbed portion of the material is not removed by washing and blocks about 10% of the surface. Figures 3; references: 3 Russian.  
[324-6508]

UDC: 630\*867.5.004.14:661.183.2

#### PROPERTIES OF CARBON ADSORBENT OBTAINED BY THERMOCATALYTIC TREATMENT OF WOOD

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4,  
May-Jun 84 pp 14-15

KISLITSYN, A. N., doctor of chemical sciences, RODIONOVA, Z. M., candidate of chemical sciences, LEBEDEVA, Z. I., junior scientific associate, Central Scientific Research Institute of Wood Chemistry

[Abstract] The authors' institute had developed an effective method of producing activated carbon from wood fiber in the presence of a chemical reagent which increased the yield of wood carbon during pyrolysis and intensifies the process. This article presents results of studies of the physical and chemical structure and adsorption properties of the carbon adsorbent obtained. The yield of carbon adsorbent by the method, studies was 18 to 20% of the absolutely dry wood fiber, 1.5 to 2 times greater than that achieved in other processes. The duration of the process is also reduced by a factor of more than 5. The carbon adsorbent obtained is superior to some industrial types of activated wood carbon in terms of adsorptive activity. The carbon adsorbent is one with primarily developed mesopore structure, macropores amounting to 85.4% of the total pore volume. The nature of the reagent used in the production of the adsorbent is not reported. Figure 1; references 5 (Russian).  
[336-6508]

UDC: 543.422.4:546.791.6

IR SPECTROSCOPIC DETERMINATION OF CONTENT OF OXYGEN ISOTOPES IN OXYGEN-18-LABELED URANYL

Leningrad RADIOKHIMIYA in Russian Vol 26, No 3, May-Jun 84 (manuscript received 10 Jun 83; in final form 20 Dec 83) pp 316-322

GAZIYEV, S. A., GORSHKOV, N. A., MASHIROV, L. G. and SUGLOBOV, D. N.

[Abstract] A description is presented of a relatively simple method of IR spectrophotometric determination of the content of oxygen isotopes in the uranyl group. In the IR spectrum, replacement of a portion of the  $^{16}\text{O}$  atoms with  $^{18}\text{O}$  atoms in the uranyl leads to appearance in addition to the band of antisymmetrical valent oscillation  $\nu_3$  of the  $[\text{}^{16}\text{O}\text{U}\text{}^{16}\text{O}]^{2+}$  of  $\nu_3$  bands of the formed  $[\text{}^{16}\text{O}\text{U}\text{}^{18}\text{O}]^{2+}$  and  $[\text{}^{18}\text{O}\text{U}\text{}^{18}\text{O}]^{2+}$ . It is possible, based on the intensity of  $\nu_3$  bands of the relative isotope forms of uranyl, to determine their relative content, as well as the overall  $^{16}\text{O}/^{18}\text{O}$  ratio in the uranyl. This requires that a uranyl compound or solution be present with suitable spectral characteristics. The authors found that the requirements were satisfied by the uranyl triacetate complex  $\text{NaUO}_2(\text{CH}_3\text{COO})_3$ . Analysis can be performed if the relative adsorption coefficients of the  $\nu_3$  band of the individual isotope forms are known. Figures 2; references 12: 5 Russian, 7 Western.  
[331-6508]

## BIOCHEMISTRY

UDC: 630\*863.5:663.14.036

### PRESERVATION OF YEAST FEED PROTEIN PRODUCERS IN LYOPHILIZED STATE

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4,  
May-Jun 84 pp 6-7

SEMUSHINA, T. N., FATEYEVA, M. F., candidates of biological sciences,  
NIKITINA, T. N. and LUK'YANOVA, V. V., junior scientific associates

[Abstract] A study was made of the possibility of using the method of lyophilization to preserve cultures of yeasts used in the production of proteins on hydrolysis media. Three-day yeast cultures were lyophilized, suspensions dried for 4 hours in a primary drying installation, then 18 hours in a secondary installation, sealed in ampules under vacuum and stored in a refrigerator at 4 to 5°C. Survival rates of lyophilized cultures were determined immediately after lyophilization, after 3, 6, 12 and 30 months of storage. The cultures were found to remain viable for 2 and one half years. The survival rate immediately after lyophilization was 26 to 45%, after 3 to 12 months 2 to 7%, after 2 1/2 years 0.01 to 4%. The lyophilized strain practically did not differ from control strains preserved by transplanting on agar in terms of yield of biomass, growth rate and productivity. References 9: 8 Russian, 1 Western.  
[336-6508]

UDC: 630\*863.5:547.466

### YEAST AUTOLYSATE AS AMINO ACID SOURCE

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, May-Jun 84 pp 9-11

POPOVA, V. A., OSTROVSKIY, D. I., KLYUKVIN, A. N. and PETREYKOVA, M. M.

[Abstract] Results are presented from studies of a new and more effective method of separating fragments of nucleic acids. A weakly basic macroporous anionite type IA-1 in hydroxyl form, a strongly basic Ara gel-type anionite and Ku-2-8 sulfocationite in hydrogen form were used. The anionite decolorizes the autolysate and separates nucleic acid fragments, the



cationite separates amino acids and lower peptides from the multicomponent mixture. The possibility was studied of replacing the macroporous weakly basic IA-1 anionite by the highly basic Ara gel type anionite while retaining the Ku-2-8 sulfocationite. The data confirmed that the use of one anionite, either strongly or weakly basic, did not assure full separation of impurities and production of a product with high amino acid content. When IA-1 and Ku-2-8 are used, double adsorption on the anionite is required to achieve the same content of nucleic acid fragment in the preparation as when Ara and Ku-2-8 are used once. Another advantage of the latter ion exchange purification system is that the time the solution spins with the biologically-active substances at pH favorable for the development of secondary microflora is reduced. Figures 2; references 3 (Russian).

[336-6508]

UDC: 630\*863.5.663.53

#### CULTIVATION OF LIPID-FORMING YEASTS ON WOOD HYDROLYSATES

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, May-Jun 84 pp 11-12

OLESHKO, V. S., candidate of biological sciences, Institute of Microbiology, Belorussian SSR Academy of Sciences

[Abstract] Studies were performed to select a productive strain capable of actively growing and synthesizing both protein and lipid on wood hydrolysates. Representatives of both lipid-forming and protein yeasts were studied. The yeasts were grown by a lipid-protein method under conditions of sufficient nitrogen and phosphorus nutrition to produce a biomass with a high content of protein and lipid. Supplementary and mineral nutrition included 10% sterile solutions of salts:  $(\text{NH}_4)_2\text{SO}_4$ ,  $\text{KH}_2\text{PO}_4$ ,  $\text{MgSO}_4$  and  $\text{CaCl}_2$ . The studies showed that, when identical conditions of cultivation were maintained, the physiological-biochemical properties of the yeast have a much greater influence on their growth than environmental conditions. Changes in the qualitative and quantitative compositions of individual fatty acids were largely related to the genus and species membership of the yeasts. The presence of significant quantities of unsaturated fatty acids gives the system affinity for vegetable fats. The studies showed that the yeasts *L. lipoferus* 199 and *Cr. terricolus* 20 were highly productive on wood fiber hydrolysates and can be used as producers in the production of protein-lipid feeds. References 4: 2 Russian, 2 Western.

[336-6508]

## CATALYSIS

UDC: 665.656.2

### KINETICS AND MECHANISM OF ISOMERIZATION OF N-HEXANE ON PLATINUM-ZEOLITE CATALYSTS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3, May-Jun 84 (manuscript received 21 Oct 83) pp 219-225

TOPCHIEVA, K. V. and DOROGOCHINSKAYA, V. A., Department of Physical Chemistry, Grozny Scientific Research Institute of Petroleum

[Abstract] Results are presented from an experimental and mathematical determination of the kinetic constants and systems of interaction in the transformation of hexane isomers. The nature of the structure of intermediate products is studied and the kinetic constants, areas of occurrence of reactions, etc., are determined. The data obtained indicate a bifunctional reaction mechanism, in which the stage of isomerization is one step in the process of successive transformation of increasingly branched isomers. Studies were performed on an installation with an integral reactor containing a charge of 25 cm<sup>3</sup> catalyst designed to operate under hydrogen pressure. Multistage isomerization is explained by considering the energy balance of the carbonium ions which are the intermediate products of the reaction. The data show that the isomerization of n-hexane on platinum-zeolite catalysts is always accompanied by hydrocracking. Like isomerization, hydrocracking begins to occur at temperatures near 230°C, increasing at about 350°C to the extent that it suppresses isomerization and above 400°C becomes the primary reaction. The isomerization of n-hexane to its isomers is first order with respect to hexane. Activation energy of the reaction is about 79.55 kJ/mol. The bifunctional mechanism is shown to be correct, isomerization occurring through an intermediate olefin present in equilibrium concentration. Figures 4; references 19: 7 Russian, 12 Western.  
[327-6508]

UDC: 543.544.25

DETERMINATION OF THERMODYNAMIC CHARACTERISTICS OF ADSORPTION OF NUMBER  
HYDROCARBON SERIES ON NaX ZEOLITE BY CHROMATOGRAPHY

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3,  
May-Jun 84 (manuscript received 2 Mar 83) pp 236-240

KEYBAL, V. L. and SHCHERBAKOVA, K. D., Department of Physical Chemistry

[Abstract] Experiments were performed on the use of capillary tubes filled with zeolite to determine the thermodynamic adsorption characteristics of hydrocarbons by a chromatographic method. The specimens of NaX zeolite were placed in the columns by various methods. The carrier gas was high purity helium, the chromatograph used the flame-ionization detection method. The zeolite was introduced in the pores of an inert carrier in one series of experiments, while pure zeolite crystals were used with ethane and propane. The results were comparable, allowing either chromatographic method to be used to study the thermodynamic characteristics of adsorption of lower hydrocarbons by zeolites. Variation in zeolite crystal diameter from 3 to 40-50  $\mu\text{m}$  had no influence on the results. Figures 3; references 10: 5 Russian, 5 Western.  
[327-6508]

UDC: 541.128.13.542.943.6

INFLUENCE OF HYDRAZINE ON CATALYTIC DECOMPOSITION OF HYDROGEN PEROXIDE ON  
PLATINUM IN ACID SOLUTIONS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3,  
May-Jun 84 (manuscript received 15 Apr 83) pp 316-317

MOKHAMED, SEDIK KHUSSEYN EL'-DIK, YELFIMOVA, G. I. and BOGDANOVSKIY, G. A.,  
Department of General Chemistry

[Abstract] Some results recently produced in studies of heterogeneous catalytic systems consisting of a catalyst plus hydrogen peroxide plus an organic component are presented. Experimental data on chemisorption of hydrazine indicate that contact of hydrazine with a degassed platinum surface is accompanied by a shift of the potential in the negative direction, the rate of shift and final potential value depending on the initial volumetric concentration of hydrazine. Although the degree of filling of platinum with products of associative adsorption increases significantly with an increase in the initial volumetric concentration of hydrazine, the chemisorbed layer does not influence the kinetics of  $\text{H}_2\text{O}_2$  decomposition, meaning that associative adsorption of  $\text{N}_2\text{H}_4$  does not occupy locations responsible for catalytic decomposition of hydrogen peroxide. It is concluded that the inhibiting effect is caused by adsorption of intermediate products arising in the process of oxidation of hydrazine by the active components of catalytic decomposition in  $\text{H}_2\text{O}_2$ . Figure 1; references 4: 3 Russian, 1 Western.  
[327-6508]

## STRUCTURE AND CATALYTIC PROPERTIES OF COMPLEXES OF POLYETHYLENEIMINE AND POLYTRIMETHYLENEIMINE WITH GROUP VIII METAL SALTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 21 Apr 83) pp 1313-1319

SHUPIK, A. N., KALASHNIKOVA, I. S. and PERCHENKO, V. N., Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences, Moscow

[Abstract] Branched polyethyleneimine with molecular weight 10,000 and 25% branching, linear PEI with molecular weight 5,000 and polytrimethyleneimine with molecular weight 6,000 were dried in a vacuum installation at 323-333A. NMR spectra and electron absorption spectra were recorded. The studies of catalytic properties of the complexes showed that their structure has a significant influence on catalytic activity. PEI and PTMI act as bidentate and monodentate ligands with transition metals. The processes of complex formation of these two reagents are quite complex, occurring in stages with successive formation of complexes with N/M ratio of 2,4,5 and 6. A structure of the complexes is suggested. Figures 6; references 16: 14 Russian, 2 Western.  
[324-6508]

UDC: 541.183

STUDY OF INTERACTION OF HYDROGEN WITH LOW PERCENT Co/Al<sub>2</sub>O<sub>3</sub> CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 25 Aug 82) pp 1378-1381

BABENKOVA, L. V., BLAGOVESHCHENSKAYA, I. N., POPOVA, N. M. and KURASHVILI, L.M., Institute of Organic Catalysis and Electrochemistry, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] A study is made of the adsorption of hydrogen and the condition of the metal in 0.1-5.0 mass % Co/Al<sub>2</sub>O<sub>3</sub> by temperature-programmed desorption and thermomagnetic resonance after various temperatures of processing of the catalysts in hydrogen. Co/Al<sub>2</sub>O<sub>3</sub> catalysts were prepared by saturating  $\gamma$ -CoAl<sub>2</sub>O<sub>3</sub> in solutions of cobalt nitrate, drying at 393K, then heating in air to 723K to constant weight. Increasing the concentration of cobalt applied and increasing the processing temperature in H<sub>2</sub> cause an increase in adsorption capacity of low-percent cobalt catalysts. The data indicate that there are changes in the adsorption properties for hydrogen when cobalt is applied to a carrier, the adsorption capacity of the applied metal increasing by a factor of about 350 due to the significant increase in dispersion, crystal size decreasing from 3000-4000A to 15-110A. Application of 1.0-5.0 mass % Co on Al<sub>2</sub>O<sub>3</sub> thus significantly increases specific hydrogen adsorption, increases the energy barrier to chemisorption, reduces the number of forms of

chemisorption and significantly strengthens the bond of a adsorbed hydrogen with the metal. Figures 2; references 23: 13 Russian, 10 Western.  
[324-6508]

UDC: 541.183:541,128.34

THERMODESORPTION STUDY OF CATALYTIC SYSTEMS, PART 19: DETERMINATION OF ACTIVATION ENERGY OF DESORPTION OF  $H_2O$  AND  $CO_2$  FROM SURFACE OF COPPER-CONTAINING CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 84 (manuscript received 12 May 83) pp 1231-1236

GEL'MAN, V. N., SOBOLEVSKIY, V. S., GOLOSMAN, Ye. Z. and YAKERSON, V. I., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow; Novomoskovsk Branch, State Institute of Nitrogen Industry

[Abstract] Continuing previous studies, the activation energy of desorption, order of reaction and purity factor were determined for  $H_2O$  and  $CO_2$  adsorbed on catalysts of various activities and compositions. Reduced specimens of a skeletal Cu catalyst, Cu-Zn-Al-Cr catalyst and Zn-Al-Ca composition were studied. The experimental methodology and method of calculating the results are not described. A test is suggested for the activity of copper-containing catalyst in the low temperature conversion of carbon monoxide based on the minimum temperature of dissociative adsorption of water. Dissociatively-adsorbed water is bonded more strongly to the surface of copper-zinc-aluminum-calcium catalysts; molecularly-adsorbed carbon dioxide is bonded more firmly to the surface of the copper skeletal catalyst. Carbon dioxide competing with dissociatively-adsorbed water can decrease the activity of the copper-zinc-aluminum-calcium catalyst, but not the copper skeletal catalyst. Figures 2; references 12: 11 Russian, 1 Western.  
[326-6508]

UDC: 541.128:666.232.6

INFLUENCE OF SPINEL FORMATION OF FISHER-TROPSCH SYNTHESIS IN PRESENCE OF  $Co-Al_2O_3$  CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 84 (manuscript received 24 May 83) pp 1247-1252

KHOANG CHONG IYEM, KRYLOVA, A. Yu., SALEKHUDDIN, S. M. and LAPIDUS, A.L., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A study is presented of the role of spinel in the synthesis of hydrocarbons from CO and  $H_2$  in the presence of a  $Co-Al_2O_3$  contact catalyst. The presence of the spinel structures in CO catalysts for Fisher-Tropsch synthesis has no significant influence on the composition of the products of synthesis except for a slight decrease in the content of olefins. Catalysts

obtained by saturation of the carrier with a solution of  $\text{Co}(\text{NO}_3)_2$  have higher resistance to oxygen, manifested as preservation of catalytic activity following exposure to large quantities of air. The formation of stoichiometric  $\text{Co-Al}_2\text{O}_4$  spinels in saturated  $\text{Co-Al}_2\text{O}_3$  catalysts during preliminary heat treatment leads to an increase in the yield of hydrocarbons synthesized from CO and  $\text{H}_2$ . Treatment of saturated CO catalysts with small quantities of air changes selectivity without decreasing activity, apparently a result of the formation of additional numbers of active CO chemisorption centers participating in the formation of liquid products. Figures 2; references 11: 6 Russian, 5 Western. [326-6508]

UDC: 542.97:547.548

#### CARBONYLATION OF m-FLUORONITROBENZENE IN PRESENCE OF SELENIUM-CONTAINING CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 84 (manuscript received 14 Jul 83) pp 1427-1428

LAPIDUS, A. L., PIROZHKOV, S. D. and ANTIPOV, Yu. V., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A study is made of carbonylation of aromatic nitrosocompounds with the formation of carbamates in order to determine the influence of the composition of a catalyst, temperature and CO pressure on the synthesis of m-fluorophenylcarbamate. Activating additives to the Se-containing catalysts were various organic bases. As CO pressure increases from 40 to 60 atm, conversion of p-fluoronitrobenzene increases from 79 to 100%. Further increases in pressure result in a decrease in conversion to 80%. As the temperature of synthesis increases, conversion reaches a maximum at 170%, then decreases. Selectivity remains unchanged. The addition of tetraethylamine, pyridine, imidazole,  $\alpha$ -aminopyridine, or tris(oxymethyl)aminomethane has a promoting effect on the reaction. With a constant quantity of  $\text{Et}_3\text{N}$ , increasing the molar ratio  $(\text{NH}_2)_2\text{CSe}:\text{Et}_3\text{N}$  from 0.5:1 to 2.0:1 increases the conversion from 34 to 100% but decreases the selectivity of formation of m-fluorophenylcarbamate. Figure 1; references 4: 1 Russian, 3 Western. [326-6508]

## CATALYTIC PROPERTIES OF ULTRASIL-TYPE ZEOLITES IN CONVERSIONS OF n-BUTANE

Moscow NEFTEKHIMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received 10 May 83) pp 326-330

KRUPINA, N. N., DOROGOCHINSKIY, A. Z., MEGED', N. F., PROSKURNIN, A. L., KOVAL'SKAYA, V. P., SHMAILOVA, V. I. and MEZHLUMOVA, A. I., Groznensk Institute of Petroleum

[Abstract] A study is presented of the catalytic properties of various ultrasil-type zeolites and factors are determined which facilitate selective occurrence of isomerization of n-butane. Cation, decationized and metal-containing specimens were studied. Molar ratios  $\text{SiO}_2/\text{Al}_2\text{O}_3$  were 30, 45, 64, 80 and 125 in the zeolites studied. Specimens were prepared with  $\text{SiO}_2$  binder 20 mass percent of the catalyst. It was shown that the degree of conversion of n-butane at  $400^\circ\text{C}$  is greatest (61.9 mass %) for the catalyst 0.5 Pt/NaUC-64, though the greatest yield of isobutane end product (16.0 mass %) was obtained at  $375^\circ\text{C}$  on 0.5 Pt/HNaUC-30 with selectivity 35.6 mass %. The results can be explained by assuming that the reactions of isomerization, cracking, disproportionation and hydrogenolysis of alkanes and their mixtures occur on different centers of the metal-zeolite catalysts. Figures 2; references 5 (Russian). [328-6508]

## OXIDATIVE DEHYDRODIMERIZATION OF TOLUENE ON LEAD-TIN OXIDE CATALYSTS

Moscow NEFTEKHIMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received 10 May 83) pp 349-352

FIRUZI, P. G., VISLOVSKIY, V. P., MAMEDOV, E. A. and RIZAYEV, R. G., Institute of Petrochemical Processes, AzSSR Academy of Sciences

[Abstract] A study is presented of the possibility of increasing the effectiveness of lead-tin oxide catalysts by introduction of a basic additive. Catalysts containing small quantities of oxides of alkaline and alkaline-earth metals were studied. The catalysts were prepared by moistening and careful mixing of lead oxide and tin dioxide with subsequent drying in air at 323K and calcining at 873K for 6 hours. The alkaline and alkaline-earth metal oxides were introduced to the catalysts as nitrates during mixing. The catalytic activity of the specimens in oxidative conversion of toluene was determined in an installation with a nonmoving catalyst layer. The reaction mixture was analyzed chromatographically. The specimen with atomic Pb/Sn ratio 4:1 with high  $\text{Pb}_2\text{SnO}_4$  content was found to be most active. Potassium oxide at 0.4 mass % was found to be the most effective promotor, increasing selectivity to 70-75% with 70% conversion. Figures 2; references 13: 7 Russian, 6 Western. [328-6508]

UDC: 547.313.2:547.538.141:542.952.6:  
542.971.2

CODIMERIZATION OF STYRENE WITH ETHYLENE IN PRESENCE OF CATALYTIC SYSTEMS  
CONTAINING NICKEL N,N-DIETHYLDITHIOCARBAMATE WITH DIETHYLALUMINUMCHLORIDE

Moscow NEFTEKHMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received  
13 Jan 83) pp 353-361

AZIZOV, A. G., AKHMEDOV, D. B. and ALIYEV, S. M., Institute of Petrochemical  
Processes imeni Yu. G. Mamedaliyev

[Abstract] A study was made of certain regularities of codimerization of styrene with ethylene in the presence of catalytic systems based on N,N-diethyldithiocarbamate of nickel. The carbamate was purified by benzene extraction from an aqueous solution with subsequent recrystallization from heptane. Codimerization was performed in an autoclave with a magnetic stirrer. It was found that the carbamate is a highly-active component in homogeneous styrene oligermization and styrene-ethylene cooligomerization catalysts. Tertiary phosphines, phosphites and styrene in small quantities lead to an increase in the number of catalytic centers and system activity. The presence of a phosphorus-containing ligand in the coordination sphere of nickel decreases activation energy of the stage of insertion of the olefin at the Ni-C bond and increases activation energy of coordination. Figures 5; references 5: 4 Russian, 1 Western.  
[328-6508]

UDC: 547.214:665.642.3

CATALYTIC PYROLYSIS OF n-BUTANE

Moscow NEFTEKHMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received  
14 Feb 83) pp 371-375

SOKOLOVSKAYA, V. G. and ADEL'SON, S. V., Moscow Institute of Petrochemical  
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[Abstract] A study was made of the process of catalytic pyrolysis of n-butane and a number of other individual hydrocarbons. Since practically no liquid products are formed in catalytic pyrolysis of n-butane, the combination of conversion is facilitated. The influence of contact time, temperature and dilution of the raw material with water vapor on yield and the distribution of reaction products was studied. Data were compared which were obtained in catalytic and thermal pyrolysis of n-butane under similar conditions. Experiments were performed on a laboratory flow-through installation in a quartz reactor with a non-moving catalyst layer in the presence of water vapor. The results show that, in catalytic pyrolysis, as contact time increases at constant temperature, the conversion of the raw material and yield per unit of raw material increase for all reaction products except propylene and total C<sub>4</sub>



hydrocarbons, the yield of which passes through a maximum. The reaction of dehydrogenation predominates where the depth of the process is not great. As conversion increases, the C-C bond is preferentially broken. Increasing dilution of n-butane in water vapor results in a decrease in its conversion, indicating other than first order reaction for catalytic pyrolysis. The n-butane consumption rate is higher in catalytic pyrolysis than in thermal pyrolysis under similar conditions. References 5 (Russian).  
[328-6508]

UDC: 547.31.057:541.128:542.91:665.652.72:54-44:546.725

#### ACTIVITY OF CATALYSTS BASED ON POLYNUCLEAR IRON COMPLEXES IN SYNTHESIS OF HYDROCARBONS FROM CO AND H<sub>2</sub>

Moscow NEFTEKHIMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received 27 Jun 83) pp 376-381

LAPIDUS, A. L., SAVEL'YEV, M. M. and TSAPKINA, M. V., Institute of Organic Chemistry, imeni N. D. Zelinskiy, USSR Academy of Sciences

[Abstract] A study was made of the catalytic properties of polynuclear complexes of iron applied to potassium-containing carriers in the synthesis of hydrocarbons from CO and H<sub>2</sub>. The influence of the addition of alkali metals on the activity and selectivity of Fe-carbonyl catalysts was examined. The variation in composition of synthesis products and conversion of CO to hydrocarbons as a function of potassium content in catalysts showed that activity and selectivity depend essentially on the content of iron and potassium in the catalyst. Maximum activity is observed for catalysts with 1.1% Fe and 8.5% K, yielding CO conversion 15 mass %, total olefin content in reaction products 37 mass %. Changing the CO:H<sub>2</sub> ratio in the initial gas mixture has practically no influence on the composition of synthesis products. Increasing space velocity from 15 to 100 Hr<sup>-1</sup> and decreasing temperature from 450 to 350°C result in an increase in the fraction of olefins in the synthesis product. Figure 1; references 6: 2 Russian, 4 Western.  
[328-6508]

UDC: 665.652.72:541.128:546.73

#### PROPERTIES OF Co CATALYSTS APPLIED TO COBALT-ALUMINUM SPINEL IN SYNTHESIS OF HYDROCARBONS FROM CO AND H<sub>2</sub>

Moscow NEFTEKHIMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received 28 Jun 83) pp 382-388

KHOANG CHONG IYEM, KHLÉBNIKOVA, T. V. and LAPIDUS, A. L., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences

[Abstract] A study was made of the properties of catalysts containing cobalt-aluminum spinel carriers in the synthesis of hydrocarbons from CO and

H<sub>2</sub>. The CO catalysts studied were obtained by mixing of freshly prepared cobalt carbonate with the carrier, mixed oxides of cobalt and aluminum prepared by saturation of  $\gamma$ -Al<sub>2</sub>O<sub>3</sub> with an aqueous solution of cobalt nitrate and subsequent calcining at 800°C for 20 to 40 hours. The carrier had spinel structure. Synthesis was performed in a flowing installation at atmospheric pressure, initial gas mixture CO:H<sub>2</sub>=1:2 by volume passing through at 800-100 hr<sup>-1</sup>. Synthesis temperature was decreased by 5 to 10°C per day over the 5 to 7 day course of the experiments. The reaction products were analyzed by GLC. The spinels were found to increase catalyst activity. Increasing the CO content in the carrier while simultaneously decreasing the quantity of CO applied to the carrier increases the optimal reaction temperature. Decreasing cobalt applied to the carrier leads to an increase in the yield of low-boiling n-paraffins. Figures 2; references 9: 4 Russian, 5 Western.  
[328-6508]

UDC: 665.652.72:661.183.6:547.12

#### SOME SPECIFICS OF CATALYTIC PROPERTIES OF Co-HIGH SILICON ZEOLITES IN FISHER-TROPSCH REACTION

Moscow NEFTEKHIMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received 25 May 83) pp 389-393

KOSYGINA, K. F., NIKIFOROVA, I. N., YAN YUN BIN, SHMIDT, F. K., NEFEDOV, B. K., KONOVAL'CHIKOV, L. D. and SKOROBOGATOVA, L. I., Institute of Petro- and Coal-Chemical Synthesis, Irkutsk State University imeni A. A. Zhdanov; All-Union Scientific Research Institute of Oil Refining

[Abstract] The catalytic properties of Co-containing high-silicon zeolites with silicate module SiO<sub>2</sub>/AlO<sub>3</sub>=30-104, synthesized in aluminum-silicon-alkaline systems with various organic reagents or no organic reagents, were studied in the synthesis of isostructure hydrocarbons by the Fisher-Tropsch reaction. High-silicon zeolites with silicate modulus 30 were synthesized in aluminum-silicate systems without organic reagent. Zeolites with modulus over 30 were synthesized in aluminum-silicon-alkali systems in the presence of tetra-butylammonium bromide, monoethanolethylenediamine, tetraethylammonium bromide and butyl alcohol. The silicate modulus was determined by the x-ray spectral method. It was found that Co-high-silicon zeolites promoted with 1-6 mass percent MgO, mechanically strengthened with Al<sub>2</sub>O<sub>3</sub> and reduced in a current of molecular hydrogen at 823K, are active in the synthesis of iso-structure C<sub>5</sub>-C<sub>10</sub> hydrocarbons. Figures 3; references 5: 2 Russian, 3 Western.  
[328-6508]

## NATURE OF ACTION OF Mo-Mn-CATALYTIC EPOXIDATION SYSTEM

Moscow NEFTEKHIMIYA in Russian Vol 24, No 3, May-Jun 84 (manuscript received 9 Nov 82) pp 408-410

BAYANOVA, N. N., FAL'KOV, I. G., NIZOVA, S. A., YABLONSKIY, O. P., and ISAYEV, E. I., Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] High temperature treatment of catalysts applied to carriers forms complex chemical compounds between the active component and the carrier, changing the electron structure and catalytic properties of the components. The compounds formed are studied and the nature of the chemical bond determined. The carrier may be either a donor or acceptor of electrons, leading to a change in the electron structure of the ion. EPR and x-ray structural analysis were used to study the initial substances and catalytic systems formed. The studies established the donor-acceptor interaction of Mo and Mn ions in the mixed catalytic system used for epoxidation of cyclohexene by cumene hydroperoxide. The increase in activity and selectivity of  $\text{MoO}_3$  caused by the addition of  $\text{MnSO}_4$  allows achievement of an oxide yield of 95% with a hydroperoxide conversion of 94-95 mass %. Figure 1; references 5: 3 Russian, 2 Western.  
[328-6508]

UDC: 541.128

## ORBITAL RESONANCE AND ITS POSSIBLE ROLE IN CATALYSIS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 8, Aug 84 (manuscript received 17 Oct 83) pp 1131-1137

KOLBANOVSKIY, Yu. A. and GAGARIN, S. G., Institute of Petrochemical Synthesis imeni A. V. Topchiyev USSR Academy of Sciences; Institute of Fossil Fuels, Moscow

[Abstract] In many catalytic processes parts are formed whose chemisorption is stronger than the chemisorption of the initial substances. This article studies cases when the term "firm chemisorption of the product" means chemisorption such that the characteristic time of desorption is significantly greater than the characteristic time of the catalytic process. The reaction of dehydration of ethyl alcohol on aluminum oxide is studied in which water is firmly chemisorbed onto the surface of the catalyst and yet the reaction continues, indicating that there is another channel for removal of the water from the catalytic center. The possibility of orbital resonance in chemisorption is demonstrated and its ability to explain the water mystery is noted. The molecules of the preliminarily adsorbed substance, water, react with the active center, modifying the local orbital structure of the center in a direction favorable for coordination of the second component, the reagent in

the catalytic reaction. Subsequent interaction stabilizes the orbitals of the molecules inserted and increases the energy of the particles extracted from the active center, weakening their bond with the surface. Since the activity of several promoters and poisons can be considered from the standpoint of their effect on orbital resonance, it is possible in principle to predict the behavior of such systems on the basis of this concept. Figures 4; references 6: 5 Russian, 1 Western.  
[362-6508]

UDC: 541.183

# SURFACE COMPOUNDS FORMED UPON CATALYTIC SELECTIVE OXIDATION OF PROPYLENE AND ISOBUTYLENE

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 8, Aug 84 (manuscript received 26 May 82) pp 1138-1143

MATYSHAK, V. A., KURMAN, P. V. and KUTYREV, M. Yu., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] An IR spectroscopic study is performed of the transformations of surface compounds formed in the reaction of selective oxidation of propylene and isobutylene on technical Co(Mg)-Mo-Bi-Fe oxide catalysts. A highly-sensitive Fourier spectrometer was used to expand the capabilities of the method. The results of quantitative processing of spectral data are compared to results of kinetic and adsorption measurements performed earlier. The specific surface of the catalyst used was 6 m<sup>2</sup>/g. Under optimal conditions (340-350°C,  $\tau=1$  s), the yield of acrolein from propylene was up to 70%, selectivity 90%; the yield of methylacrolein from isobutylene was up to 55%, selectivity 75%. The surface compounds detected were cyclical di(poly)enes with carbonyl groups similar to anhydrides or salt-like. The spectrum observed during the course of oxidation of isobutylene contains absorption bands which may relate to the linear anhydride compounds. Intensive absorption at 1610 cm<sup>-1</sup> indicates the presence of additional conjugate double bonds, apparently resulting from interactions with the surface of the catalyst. These compounds cover about 1% of the catalyst surface. The compound was identified in a previous work as PS-II. Spectroscopic measurements must be performed to further demonstrate that it is indeed the intermediate compound formed. Figures 3; references 15: 10 Russian, 5 Western.  
[362-6508]

UDC: 535.858+548.285

STUDY OF HETEROGENEOUS CATALYSTS BASED ON FURTHER FINE STRUCTURE OF X-RAY  
ABSORPTION SPECTRA (EXAFS). (Pt+Re)/SiO<sub>2</sub> CATALYSTS

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 8, Aug 84 (manuscript  
received 7 Feb 83) pp 1148-1155

KOCHUBEY, D. I., KOZLOV, M. A., ZAMARAYEV, K. I., STARTSEV, A. N. and  
YERMAKOV, Yu. I., Institute of Catalysis, Siberian Department, USSR Academy  
of Sciences, Novosibirsk

[Abstract] A study is made of the spectra of EXAFS for platinum and rhenium  
in bimetallic (Pt+Re)/SiO<sub>2</sub> catalysts obtained by attachment of [Re(OC<sub>2</sub>H<sub>5</sub>)<sub>3</sub>]<sub>3</sub>  
and Pt(C<sub>4</sub>H<sub>7</sub>)<sub>2</sub> complexes to silica gel with subsequent reduction by hydrogen.  
A study is made of the immediate vicinity of the platinum and rhenium reduced  
at various temperatures. The EXAFS data indicate that in the catalysts  
studied, the rhenium and platinum atoms are grouped on the surface of the  
SiO<sub>2</sub> in mixed multinuclear complexes containing several rhenium atoms  
coupled to the oxygen atoms of the carrier. There are no chemical bonds  
among the rhenium atoms in these complexes, while the platinum atoms apparent-  
ly form chemical bonds with the rhenium atoms. Figures 3; references 13:  
9 Russian, 4 Western.  
[362-6508]

UDC 665.658.6+665.656.2+547.534.2+547.534.1

ISOMERIZATION OF MIXTURES OF XYLENES WITH ETHYLBENZENE OVER CATALYST IK-78

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 9-10

BROVKO, V.N., BURSIA, N.R., VOLYANYUK, B.I., ZUYEV, V.A. and MARTYNOVA, G.B.,  
Production Association "Kirishinefteorgsintez", Scientific Production Associa-  
tion "Lenneftekhim"

[Abstract] Catalyst IK-78 (platinum on mordenite) is currently being tested  
at the "Kirishinefteorgsintez" Production Association for hydroisomerization  
of mixtures of xylenes and ethylbenzene. Compared to a previously-used  
imported catalyst, IK-78 permits running the isomerization process at lower  
temperatures and pressures, less catalyst charge, higher space velocity and  
less frequent catalyst regeneration. After 1.5 years testing, the catalyst  
has satisfactory activity, selectivity and stability. Testing is still be-  
ing continued. Figures 2; references 6: 4 Russian, 2 Western.  
[374-12765]

## SULFUR RESISTANCE OF SELECTIVE HYDROCRACKING CATALYST BASED ON SYNTHETIC ERIONITE

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 11-12

SHIPIKIN, V.V., TOLKACHEVA, I.N., GEORGIYEVSKIY, V.Yu. and OSADCHENKO, A.I., Scientific Production Association "Lenneftekhim"

[Abstract] While selective hydrocracking is normally used to improve anti-knock properties of aromatic raffinates, it may also be used to increase the octane number of some straight-run gasoline fractions, and the sulfur resistance of the selective hydrocracking catalyst can become a deciding factor in selecting a scheme for refining these fractions. A study was made of the effects of sulfur-containing gasoline fractions on the properties of selective hydrocracking catalyst SG-3M based on synthetic erionite and containing 7% by wt. molybdenum trioxide and aluminum oxide as binder. Pilot plant tests on benzene-toluene raffinates with varying amounts of sulfur compounds showed that the catalyst is affected not by the organic sulfur compounds themselves, but by the hydrogen sulfide formed during decomposition of these compounds. SG-3M catalyst is thus markedly effective against organic sulfur compounds, but it becomes poisoned by them. This poisoning is reversible and can be compensated by elevating the process temperature. Figures 3; references 2 (Russian).

[374-12765]

## ADSORPTION OF FORMALDEHYDE IN ELECTROCHEMICALLY DISPERSED PLATINUM ON GRAPHITE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 9, Sep 84  
(manuscript received 14 Jun 83) pp 2305-2307

KAMYSHANOVA, G. F. and BOGDANOVSKIY, G. A., Department of Chemistry, Moscow State University imeni M. V. Lomonosov

[Abstract] Adsorption of formaldehyde from acid solutions over electrochemically dispersed platinum on a graphite base was studied. Platinum content and the extent of graphite filling with platinum  $\alpha_{Pt}$  were determined assuming that Pt is dispersed on the graphite in monoatomic layers. It was shown that the adsorption of formaldehyde on this type of graphite was accompanied by dehydrogenation-selfhydrogenation processes depending on the presence of platinum on graphite. Dehydrogenation of formaldehyde occurred on that part of the precipitated platinum which showed high adsorption potential for hydrogen. The selfhydrogenation processes were related to platinum with low adsorption potential. High values of  $\theta'_R$  and  $\theta_R$  indicated considerable adsorption of formaldehyde by platinum and predominance of

chemisorption over physical adsorption. The graphite itself was capable of adsorbing considerable quantities of formaldehyde without following oxidation-reduction processes. A conclusion was reached that, in contrast to pure graphite, adsorption of formaldehyde on platinized graphite was identical to its adsorption on platinized platinum. Figures 3; references 4 (Russian) (1 by Western author).  
[15-7813]

UDC 543.422:541.183

STUDY OF EFFECTS ON TIN ADDITIVES ON ACCEPTOR PROPERTIES OF ALUMINUM-  
PLATINUM CATALYST SURFACE

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 9, Sep 84  
(manuscript received 18 Nov 83) pp 2308-2311

KRYUKOVA, O. A., LUNINA, Ye. V., BORONIN, V. S. (deceased) and STRAKHOV, B. V.,  
Department of Chemistry, Moscow State University imeni M. V. Lomonosov

[Abstract] Addition of tin to Al-Pt catalysts increases their stability and regulates the selectivity of action. A study of the acceptor effects of the surface of Pt, Sn/Al<sub>2</sub>O<sub>3</sub> catalysts was carried out using EPR methodology. The nitroxyl radical 2,2,6,6,-tetramethylpiperidin-1-oxyl was used as a probe. When the Al<sub>2</sub>O<sub>3</sub> surface was treated with 0.1 N HCl, the concentration of the acceptor centers dropped significantly. Deposition of platinum on tin modified or tin free surface of Al<sub>2</sub>O<sub>3</sub> led to significant decrease of the acceptor properties. However, introduction of tin (up to 0.9%) imparted no significant effect on the acceptor properties of the Al<sub>2</sub>O<sub>3</sub> surface, nor on the interaction of platinum with the carrier. Figure 1; references 10: 7 Russian, 3 Western.  
[15-7813]

UDC 541.128

DILUTION EFFECT ON CATALYTIC ACTIVITY OF ZIEGLER-NATT METALORGANIC COMPLEXES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 9, Sep 84 (manuscript received 18 May 82) pp 2319-2321

NOSKOVA, N. F., AZERBAYEVA, G. Kh., BRODSKIY, A. R., MARUSICH, N.I.,  
SAVEL'YEV, S. R. and SHARIFKANOVA, G. N., Institute of Organic Catalysis  
and Electrochemistry, KaSSR Academy of Sciences, Alma-Ata

[Abstract] The activity of catalytic systems based on cobalt and iron stearate and nickel naphthenate combined with triethylaluminum was studied on the example of cyclohexene hydrogenation in heptane and toluene and hydrogenation of sunflower oil in heptane. It was shown that, keeping the

amount of metalorganic catalyst constant and the Al/Me ratio greater than 4, the dilution with heptane led to a 2.5-5 fold increase of the hydrogenation rate of cyclohexene. Different behavior of the catalyst in heptane and toluene was possibly due to the competitive chemisorption between toluene and cyclohexene; toluene occupies free coordination sites of the active centers preventing activation of the reagents. The activity of the catalyst being diluted correlated with the amount of the multinuclear associated complex. Figures 4; references 2 (Russian).  
[15-7813]

UDC 541.128

#### DISTRIBUTION OF METALS IN SKELETAL STRUCTURE OF IRIIDIUM-NICKEL CATALYSTS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 8, Aug 84  
(manuscript received 16 Nov 82) pp 1922-1925

DANIL'CHUK, V. P., SEMENOVA, A. D. and VOVCHENKO, G. D., Moscow State University imeni M. V. Lomonosov, Chemical Department

[Abstract] Studies have been devoted recently to properties of polymetallic skeletal catalysts, but few articles have concerned their structure. The present article reports on study of phase composition and relative content of iridium, nickel and aluminum in various phases of irridium-nickel catalysts. Local X-ray analysis was done after compression into tablets at 100,000 atm. to obtain smooth surfaces. Previous findings were confirmed indicating that at 60-80% iridium atomic weight, intermetallic reaction led to great homogeneity, while at 20-40% there was great heterogeneity of composition. Distribution of residual aluminum as determined by local X-ray analysis was of interest and showed up to 10% by atomic weight and more, probably because of strong aluminum-iridium bonds. In general, the phase composition of skeletal iridium-nickel catalysts did not correspond to that of compact alloys of these metals, due to heterophase composition and aluminum impurities. Figure 1; references 8 (Russian).  
[379-12131]



## COAL GASIFICATION

UDC: 662.741.3:66.097.7:66.07:669.162.275.3.001.5

### STUDY OF CATALYTIC ACTIVITY OF COKE IN PROCESS OF PRODUCING REDUCED GASES FOR METALLURGY

Moscow KOKS I KHIMIYA in Russian No 7, Jul 84 pp 21-23

ZUBILIN, I. G., Kharkov State University

[Abstract] Experimental studies of the process of conversion of coke gas hydrocarbons on coke and neutral packing have shown that coke has catalytic activity in the conversion of gaseous hydrocarbons. It has been established that activation of the process of conversion is determined not by the surface of the coke but rather by its catalytic capacity. A series of experiments have demonstrated that the mineral portion of coke containing slight impurities with nonstoichiometric composition does not catalyze the reaction of conversion of coke gas hydrocarbons. The catalytically active portion of the coke is its organic portion. This activity is determined by the concentration of elementary structural units-- $\pi$ -electron carriers. A mathematical description is presented of the process of conversion of coke gas hydrocarbons. The regression equations obtained indicate that the production of reducing gases from coke gas over metallurgical coke is a controlled process with parameters which can be obtained. Figures 2; references: 7 Russian. [335-6508]

UDC: 662.764.074.371.002.5.074.511

### PROCESSING OF COKE GAS IN ABSORBER WITH PLATES

Moscow KOKS I KHIMIYA in Russian No 7, Jul 84 pp 26-30

ZELINSKIY, K. V., NAZAROV, V. G., SHARKINA, V. S., Eastern Scientific Research Institute of Coal Chemistry, LEBEDEV, Yu. N., KATSASHVILI, V. G., All-Union Scientific Research Institute of Petrochemical Machinery, KLIMENKO, V. I. and ANDRESSON, M. A., Kaliningrad Coke Gas Plant

[Abstract] A study was made of the hydrodynamics and kinetics of absorption in dual-pass plate-type absorbers, as well as the influence of technological

parameters of the effectiveness of the mass transfer process for the conditions of ammonia sulfur purification of coke gas. Three plates were installed in a 2000 mm diameter industrial column at the Kaliningrad Coke Gas Plant. Experiments were performed at a constant gas speed of 19-20 m/s, liquid load 0.26-2.33 l/m<sup>3</sup> of gas using fresh process water for sprinkling plus ammonia solutions with NH<sub>3</sub> concentrations 0 to 9 g/l, CO<sub>2</sub> concentrations 0 to 7.4 g/l. Gas samples were taken upstream and downstream from the plates. The results of hydrodynamic studies showed that they had low hydraulic resistance, high productivity and effectiveness with short phase contact time. Selectivity of absorption can best be improved for H<sub>2</sub>S by utilization of parallel plate absorption. H<sub>2</sub>S absorption rates remain constant as temperature varies from 19 to 35°C, then decreases at higher temperatures due to the decrease in selectivity of the process as a result of a great increase in the rate of extraction of CO<sub>2</sub>. Figures 7; references 13: 11 Russian, 2 Western.  
[335-6508]

UDC: 662.749.33.004.6:547.752:547.732.05:347.24

SEPARATION OF VALUABLE HETEROCYCLIC COMPOUNDS FROM RAW BENZENE AND COAL TAR

Moscow KOKS I KHIMIYA in Russian No 7, Jul 84 pp 30-33

TAYTS, S. Z., ZARETSKIY, M. I., PODOLYAK, V. G., GOLUB, V. B., CHARTOV, E. M., and USYSHKINA, I. V., Institute of Organic Chemistry, USSR Academy of Sciences

[Abstract] This article discusses a previous article entitled "Prospects for processing of tar and raw benzene in Ukrainian plants." The authors of the present article discuss the possibility of producing certain heterocyclic compounds which can now be separated from the products of coke chemistry. Thiophene and benzene can be extracted by fractional distillation using two columns, producing a 30% thiophene fraction. Benzothiophene and naphthalene can be separated by extractive distillation using 2-pyrrolidone, possibly mixed with certain polar compounds, as the extracting agent. Indole can be extracted from mixtures with aromatic hydrocarbons by continuous counterflow liquid phase extraction using ethanolamine and heptane. Figures 3; references 18 (Russian).  
[335-6508]

POSSIBILITY OF DECREASING CONTENT OF 3,4-BENZOPYRENE IN COAL PITCH

Moscow KOKS I KHIMIYA in Russian No 7, Jul 84 pp 36-38

SUKHORUKOVA, Ye. A., KHARLAMPOVICH, G. D., SLYSHKINA, T. V., KUZ'MINYKH, A. I.,  
PONOMAREV, A. V. and MARKOVA, N. V., Ural Polytechnic Institute

[Abstract] 3,4-Benzpyrene (BP) is a major harmful polluting substance contained in the products of conversion of coal tar. High temperatures (around 400°C) used in all Soviet coal tar processing systems may increase the formation of BP. Decreasing the temperature to 355°C and processing pitch at 250-300°C can inhibit the reactions which form BP. Decreased BP content in pitch allows oxidative processing by aeration with air with or without addition of oxygen or ozone. The degree of transformation of BP increases when ozone is used in small quantities. This method can reduce the BP content of end products to 0.25-0.28% by mass, not over 1/10 the content of pitch produced by today's methods. Figures 4; references 4 (Russian).  
[335-6508]

UDC: 662.749.33.002.5

DIRECT-FLOW ABSORPTION OIL REGENERATOR

Moscow KOKS I KHIMIYA in Russian No 7, Jul 84 pp 41-43

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BRODSKIY, E. V., BABITSIN, S. M., Dnepropetrovsk Chemical Engineering  
Institute imeni F. E. Dzerzhinskiy and GULYAYEV, V. M., Dneprodzerzhinsk  
Industrial Institute

[Abstract] A direct-flow coal absorption oil regenerator has been developed and installed at the Dnepropetrovsk Coke-Chemical Plant. Based on the same operating principle as a nonpressurized Venturi scrubber with film sprinkling, the direct-flow regenerator allows additional intensification of interphase heat and mass transfer due to repeated transformation of the phase interaction conditions. The high speed of the two-phase flow (over 15 to 20 m/s) in the apparatus significantly reduces its size and weight in comparison to a standard regenerator. The direct flow regenerator provides the same degree of distillation as a standard apparatus at lower oil temperatures, allowing reduction or complete elimination of input of additional heat with the steam. Figure 1; references 5 (Russian).  
[335-6508]

## COMBUSTION

UDC: 541.11

### HEATS OF COMBUSTION AND FORMATION OF SYMMETRICAL TRIAZINE DERIVATIVES

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 7 Dec 82) pp 1556-1558

GROMOVA, T. I., LYUBARSKIY, M. V. and SUKHANOVA, T. G., All-Union Scientific Research and Technology Institute of Herbicides and Plant Growth Regulators, Ufa

[Abstract] Studies were performed in an isothermal water bath calorimeter. The enthalpies of combustion were determined for 2,4-dichloro-6-ethylaminosymm-triazine, 2-chloro-4,6-bis(ethylamino)-summ-triazine; 2-chloro-4-ethylamino-6-isopropylaminosymm-triazine and 2-chloro-4,6-bisisopropylaminosymm-triazine. The primary experimental data were processed by the method of Hu in order to reduce the actual process occurring in the calorimeter bomb to an idealized combustion reaction. The experimental results are presented in tabular form for each of the compounds. The standard formation enthalpy in the crystalline state was calculated using Hess's law based on the combustion reaction as computed from the experimental data. References 11: 8 Russian, 3 Western.  
[324-6508]

UDC 678.029.46:614.841.41

### FLAMMABILITY OF REINFORCED PLASTICS BASED ON THERMOPLASTICS

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 52-53

VOROB'YEV, V.N., BYCHIKHINA, L.V., BAZENKOVA, Ye.N. and PEROV, B. V.

[Abstract] A drawback of reinforced thermoplastics is their high flammability. A study was made of the effects of organic- and glass-reinforced fabrics and binder type on the flammability parameters of polysulfone, bromine- and fluorine-containing polycarbonates as thermoplastics, and SVM (synthetic high molecular weight material) and T15P-76 glass fiber as fabric binders. A comparison shows that the flammability limits of reinforced plastics are

higher than those of their initial films. As the flame is spread from top to bottom, the KI (oxygen index) decreases owing to the higher content of binder (the more flammable component). Polysulfone with SVM binder had the highest effect in lowering flammability, while fluorine-containing polycarbonates with SVM binder had the least. Apparently, the coke layer thickness is greater with a higher binder content. This inhibits release of flammable products and facilitates heat transfer. Figure 1; references 4: 2 Russian, 2 Western. [375-12765]

UDC 678.5:661.784:678.029.65

#### FIRE RESISTANCE OF COMPOSITIONS BASED ON DIALLYLISOPHTHALATE

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 53-54

MINDLIN, Ya.I., CHUBAROVA, G.V., RABEN, I.N., VOROB'YEV, V.N., CHERNOUSOVA, S.V., KAVUN, N.S. and KECHER, R.M.

[Abstract] Materials based on diallylisophthalate have high dielectric, mechanical and optical properties, and they are used as binders in press materials for the electronics industry. However, these materials are flammable, polydiallylisophthalate having an oxygen index (KI) of 21-22%. A study was made of the possibility of lowering the flammability of diallylisophthalate-styrene copolymer by copolymerization with diallyl esters of chlorendic and phenylphosphonic acids and mixtures thereof. Analysis shows that the KI of the cured composition depends on the amount of antipyrène added. Thus, the KI stays constant to not over 20% diallyl ester of chlorendic acid content, while in the presence of 5-20% diallylphenylphosphinate, the KI increases to 26-28%. Adding both compounds produces a synergistic effect, raising the KI even more. Figure 1; references 5: 2 Russian, 3 Western. [375-12765]

UDC 678.743:66.021.21.23

#### ENDOTHERMAL AND EXOTHERMAL PHENOMENA DURING THERMODESTRUCTION OF POLYVINYL FLUORIDE

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 62-63

ASAMOV, M.K., YUL'CHIBAYEV, A.A., MUSAKHANOVA, S.M. and AKHMEDOVA, M.

[Abstract] A study was made of the thermostability of polyvinyl fluoride obtained by bulk polymerization with a free radical initiator in air and in nitrogen. The thermal properties of the polymer were studied derivatographically and the results show that polyvinyl fluoride thermodestruction is a complex chemical process which includes both autodestructive conversions and secondary reactions between macromolecules and their decomposition products. References 5 (Russian). [375-12765]

## FREE RADICALS

UDC: 541.515:541.183:549.678.2

### FORMATION OF RADICALS IN ADSORPTION OF CERTAIN HETEROATOMIC COMPOUNDS ON N-MORDENITE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 6, Jun 84 (manuscript received 21 Apr 83) pp 1241-1246

KUCHEROV, A. V., SLINKIN, A. A. and LITVINOV, V. P., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] The EPR method was used to study the interaction of N-mordenite with thiophene and a number of its derivatives as well as certain other heterocyclic substances at temperatures from -78 to +300°C. The data obtained for the thiophene radical chemisorbed in the structure of N-mordenite were compared with the results of quantum chemical calculations of parameters of EPR spectra for free cation- and anion-radicals of thiophene. It is shown that the adsorption of thiophene and its methyl substituents on N-mordenite at 20°C is accompanied by the formation of radicals yielding individual EPR spectra with superfine structure. Replacement of the sulfur atom with oxygen has no significant influence on the distribution of the unevaporated electron in the radical particle. Comparison of parameters of EPR spectrum superfine structure for adsorbed thiophene radicals with the results of quantum chemical calculation shows that in adsorption of thiophene and its derivatives on N-mordenite, anion radicals are formed. The formation of anion radicals of thiophene is confirmed by experiments involving its joint adsorption on N-mordenite with SO<sub>2</sub> acceptor molecules. Figures 3; references 8: 3 Russian, 5 Western.  
[326-6508]

ANALYSIS OF EPR SPECTRUM OF PRODUCTS OF INTERACTION OF DEXTRAN WITH DEUTERIUM ATOMS IN FROZEN SULFATE SOLUTIONS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 37, No 5, May 84  
(manuscript received 14 Apr 83) pp 281-286

ABAGYAN, G. V. and APRESYAN, A. S., Institute of Physical Studies, Armenian SSR Academy of Sciences, Ashtarak

[Abstract] A detailed study of the EPR spectrum of products of interaction of dextran with atoms of deuterium in a solution of sulfuric acid at 120K is performed. Commercial preparations of dextran with molecular masses of 40,000 and 110,000 were studied without additional purification. The products of the interaction of deuterium atoms with dextran at 120K featured primarily secondary free radicals developing as a result of decomposition and dehydration of the primary  $\alpha$ -hydroxyl radicals. This is because deuterium atoms generated by photolysis at 77K have no mobility, requiring heating to 120K or higher to allow diffusion, at which point the deuterium atoms not only react with dissolved molecules but the  $\alpha$ -hydroxyl radicals formed partially decompose and are dehydrated. Figures 3; references 14: 9 Russian, 5 Western. [340-6508]

UDC: 539.219.3.721.245

STUDY OF SOLID PHASE INTERACTION OF MAGNESIUM AND NICKEL

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3, May-Jun 84 (manuscript received 20 May 83) pp 264-266

RUSNYAK, V. D., DUNAYEV, S. F., SLYUSARENKO, Ye. M. and SOKOLOVSKAYA, Ye. M., Department of General Chemistry

[Abstract] A study is presented of processes of mutual diffusion in an Mg-Ni system. Conditions of solid phase formation of the compound  $Mg_2Ni$  are analyzed. The study was performed on electrolytic nickel, carbonyl nickel and 99.95% pure magnesium. The diffusion interaction was studied by optical and electron microscopy, local x-ray spectral analysis and x-ray phase analysis. Diffusion annealing was performed in ampules evacuated to  $10^{-2}$  Pa at 650-775K, maintained with an accuracy of  $\pm 2K$ . It was found that a layer of  $Mg_2Ni$  is formed at the interface, the width of the layer changing with diffusion annealing time according to a parabolic equation. The diffusion zone in Mg-Ni vapor was found to be a quasiequilibrium zone, for which the diffusion characteristics can be determined. The characteristics calculated agree well with earlier works and allow prediction of the nature of interaction of magnesium with nickel-based alloys. Figure 1; references 7: 4 Russian, 3 Western. [327-6508]

UDC: 541.123.3

MIXED URANIUM AND RARE EARTH CERIUM SUBGROUP SELENIDES WITH COMPOSITION  $Ln_2USe_5$  AND  $LnU_2Se_5$

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 7, Jul 84 (manuscript received 24 Feb 83) pp 1676-1678

SLOVYANSKIKH, V. K., KUZNETSOV, N. T. and GRACHEVA, N. V., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] Crystals of the compound  $Ln_2USe_5$  and  $LnU_2Se_5$  were obtained in evacuated quartz ampules in a dual-zone furnace with temperatures of 1140 and



1060K in the two zones. Initial materials used were  $\text{Ln}_2\text{Se}_3$  (0.2g),  $\text{USe}_2$  (0.3g) and metallic uranium (20-40 mg). The transporting reagent used was bromine. The initial bromine concentration was  $0.4 \text{ mg/cm}^3$ . The variation of transfer as a function of selenium concentration in the initial substance was studied for the mixed samarium and uranium selenides. Differential thermal, x-ray phase and microstructural analysis were performed for the compounds. The products produced were both melted and single crystals. The compounds crystallize in a rhombic structure similar to  $\text{U}_3\text{Se}_5$ . Figures 3; references 5 (Russian).  
[338-6508]

UDC: 541/117+535.33

IR SPECTROSCOPIC STUDY OF PRODUCTS OF INTERACTION OF LANTHANIDE ATOMS WITH MOLECULAR CHLORINE IN ARGON MATRIX

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 7, Jul 84  
(manuscript received 25 Oct 83) pp 1718-1722

LOKTYUSHINA, N. S., OSIN, S. B. and MAL'TSEV, A. A., (deceased), Moscow State University imeni M. V. Lomonosov

[Abstract] The method of synthesis of molecules in an inert gas matrix was used to study the products of reactions of lanthanide atoms with molecular chlorine. The metals selected included lanthanides in which normal and anomalous elements may manifest normal or anomalous properties in a number of compounds. The experimental method is a modification of the method of isolation of molecules in matrices. The IR spectra of the products are studied in the  $400\text{-}100 \text{ cm}^{-1}$  range. The main products of the reactions are molecules of dichlorides in the system  $\text{Eu}+\text{Cl}_2$  and  $\text{Yb}+\text{Cl}_2$  and trichlorides in the system  $\text{Gd}+\text{Cl}_2$ . In the system  $\text{Ho}+\text{Cl}_2$ , the relative quantities of dichlorides and trichlorides depend on matrix formation conditions. Full information on the structure and properties of  $\text{LnCl}_n$  molecules can be obtained from spectral data. Figure 1; references 20: 7 Russian, 13 Western.  
[338-6508]

UDC: 541.123.3

MIXED SULFIDES OF  $\text{NbUS}_3$  AND  $\text{TaUS}_3$

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 29, No 7, Jul 84  
(manuscript received 15 Jun 83) pp 1898-1900

SLOVYANSKIKH, V. K., KUZNETSOV, N. T. and GRACHEVA, N. V., Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, USSR Academy of Sciences

[Abstract] A state diagram of a portion of an  $\text{NbS-US}_2$  polythermic section was constructed based on the results of differential thermal analysis,

x-ray phase analysis and microstructural analysis. Homogenous specimens were obtained by pressing NbS and TaS powders and sintering in sealed molybdenum crucibles at 1870K. The compounds crystallize in a rhombic structure with the following crystalline lattice parameters:  $\text{NbUS}_3$ :  $a=8.99$ ,  $b=6.1$ ,  $c=6.65\text{\AA}$ ;  $\text{TaUS}_3$ :  $a=8.9$ ,  $b=6.10$ ,  $c=6.64\text{\AA}$ . Figure 1; references 2 (Russian).  
[338-6508]

UDC 541.8.121;536,7

STUDY OF ACOUSTIC PROPERTIES OF ALLOYS IN Mg-Sn, Mg-Pb SYSTEMS AND EVALUATION OF THEIR COMPRESSIBILITY

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 8, Aug 84  
(manuscript received 8 Dec 82) pp 1913-1917

GLAZOV, V. M., PAVLOVA, L. M., POYARKOV, K. B. and KIM, S. G., Moscow  
Institute of Electronic Equipment

[Abstract] Physicochemical analysis of double Mg-Sn and Mg-Pb systems have shown the presence of characteristics like those of stoichiometric relationships in  $\text{Mg}_2\text{Sn}$  and  $\text{Mg}_2\text{Pb}$  compositions. The present article reports on ultra-sound study, with an impulse interferometric method, of structural and chemical properties. Within standard limits of experimental error, the tests showed that adiabatic and isothermal compressibility in the two alloys, and other properties, suggested structural changes in the liquid alloys throughout the entire range of mixture proportions, from pure magnesium to pure lead or tin. At the same time, nuances of chemical reactions in the metallic zones indicated the formation of a maximum number of bonds between the various atoms of the compositions, showing dissociation of  $\text{Mg}_2\text{Sn}$  and  $\text{Mg}_2\text{Pb}$  alloys during melting. Figures 2; references 11: 9 Russian, 2 Western.  
[379-12131]

UDC: 541.183.12:54-412.2

STUDY OF ADSORPTION MECHANISM OF NITROXOAMINAZO BY AV-17 ANION EXCHANGE RESIN

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3, May-Jun 84 (manuscript received 14 Mar 83) pp 282-283

BRYKINA, G. D., CHANDRA, AMALESH, and BELYAVSKAYA, T. A., Department of Analytic Chemistry

[Abstract] A study was made of the mechanism of adsorption of nitroxoaminazo (NOA) suggested for use in sorption-photometric determination of palladium, AV-17x8-Cl ion exchange resin, grain size 0.1-0.25 mm, was used. 0-10 ml of  $1 \cdot 10^{-3}$  M reagent solution was placed in volumetric flasks, diluted to 30 ml and mixed with 0.1 g AV-17x8-Cl and mechanically vibrated for 2 hours. The quantity of adsorbed reagent was judged from the change in optical density of the NOA solution of 44 nm. The results show that in a near neutral medium adsorption of NOA occurs by an ion-exchange mechanism with three sulfo-groups of the reagent and an oxygroup participating in the reaction. Since adsorption of NOA is largely independent of pH, it is assumed that NOA is adsorbed by an ion-exchange mechanism in acid and alkaline media as well. The incomplete desorption of the reagent from AV-17 even in strongly-acid media indicates additional interactions between nitroxoaminazo and the ion-exchange resin matrix. Figure 1; references 5: 4 Russian, 1 Western. [327-6508]

NITROGEN COMPOUNDS

UDC: 541.124.16:548.31:542.48:547.87

THERMAL DECOMPOSITION OF 1,3,5-TRINITRO-1,3,5-TRIAZACYCLOHEXANE IN SOLID STATE

Moscow KHIMICHESKAYA FIZIKA in Russian Vol 3, No 8, Aug 84 (manuscript received 27 Aug 83) pp 1126-1130

BUROV, Yu. M. and NAZIN, G. M., Department of the Chemical Physics, USSR Academy of Sciences, Chernogolovka

[Abstract] The decomposition of hexogen in the solid state is studied by a manometric method in the 140-185°C interval. Rate constants are calculated by a first order equation in the linear section with decomposition depth to 0.1% and total gas liberation 600 cm<sup>3</sup>/g. Hexogen was prepared by recrystallization from acetone with subsequent drying or sublimation at 150-160°C onto a substrate at t=80°C, residual pressure 10<sup>-3</sup> Torr. The manometric method determined parameters of solid phase decomposition of hexogen to be  $E=40 \pm 1.5$  kcal/mol,  $\log A=11.3$  s<sup>-1</sup>,  $k_g/k_s=10^4$ . The reaction of thermal decomposition of hexogen is apparently localized on nonequilibrium defects. Figures 2; references 8: 3 Russian, 5 Western.  
[362-6508]

UDC 577.15.083+547.258.11

PREDESIGNED STRUCTURING AND SYNTHESIS OF ORGANO-TIN COMPOUNDS HAVING ANTI-MICROBIAL PROPERTIES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 7, Jul 84 (manuscript received 10 May 83) pp 1559-1566

TYURINA, L.A., KUZNETSOVA, G.V., SEMENOV, V.A., MALKOVA, T.I., VORONKOV, M.G. and MIRSKOV, R.G., Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences

[Abstract] To further the study and increase the number of biologically-active organo-tin compounds, an analysis was made of the structure-activity correlation and the predicted structure of hypothetically-active tin derivatives by a special algorithm. Mathematical analysis of the structure-antimicrobial activity of a number of organyl(organylthio)stannanes revealed the existence of structural units that are responsible for the antimicrobial effect. The possibility of synthesizing pre-designed biologically-active substances containing the Sn-S bond was demonstrated and experimentally confirmed. References 6: 4 Russian, 2 Western.  
[382-12765]

UDC: 547.24

INTERACTION OF DIPROPYL AND DIPHENYLIODOPHOSPHINES WITH ETHYLENE OXIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 26 Jul 83) pp 1242-1245

GOMELYA, N. D., MATYUSHA, A. G. and FESHCHENKO, N. G., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A study was made of the interaction of dipropyl- and diphenyliodophosphines (Ia,b) with ethylene oxide. When diorganyliodophosphines are interacted with an excess of ethylene oxide in a solution of methylene chloride,  $\beta$ -iodoethyl esters of the corresponding diorganylphosphinic acids (IIa,b) and ethylene are formed. Ethylene begins to be liberated immediately after mixing of the reagents.  $\beta$ -Iodoethyl esters of diorganylphosphinic acids were identified by elemental analysis,  $^{31}\text{P}$  NMR spectra and hydrolysis of 20% hydrochloric acid to the corresponding acid. When Ia and b are interacted with ethylene oxide at 1:1, diorganylphosphinic acid iodides are obtained for the first time. However, these compounds are immediately converted to dipropyltriiodophosphorane (IVa) and the corresponding pyrophosphate (Va). When diphenyliodophosphine is interacted with ethylene oxide in a benzene solution an adduct of ethylene oxide with benzene is apparently initially formed, after which an uncontrollable interaction with diphenyliodophosphine yields ethylene rather violently. The end products are diphenyltriiodophosphorane (IVb) and pyrophosphate (Vb). References 6: 2 Russian, 4 Western.  
[330-6508]

CHEMICAL PROPERTIES OF TETRAALKYLDIAMIDOIODOPHOSPHITES AND TETRAALKYLDIAMIDO-  
IODOTHIOPHOSPHATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 23 Sep 83) pp 1245-1251

MITEL'MAN, I. Ye., GORBATENKO, Zh. K. and FESHCHENKO, N. G., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] It is established that the reason for the low stability of tetraalkyldiamidoiodophosphites (I) is equilibrium disproportionation similar to that described for tetraalkyldiamidochlorophosphites. It is experimentally established that when hexaethyltrimidophosphite (IIb) interacts with diethylamidodiiiodophosphite (IIIb), tetraethyldiamidoiodophosphite (Ib) is formed plus a quasiphosphonium salt (IV) and a high-melting-point polymer product (V). Tetraalkyldiamidoiodophosphites (I) attach elementary sulfur when heated in benzene to form tetraalkyldiamidoiodothiophosphites (VI). Interaction of (VI) with (IIb) forms hexaethyltriamidothiophosphate (VII), (Ib), (IV) and bis(tetraethyldiamido)diphosphine disulfide (VIII). Diamidothiophosphites (VI) are thus sulfating and iodinating reagents. References 16: 7 Russian, 9 Western.  
[330-6508]

STUDY OF STRUCTURE OF O,O-DIALKYL ESTERS OF S-(1-N-ACETAMIDO-2,2,2-TRICHLORO-  
ETHYL)MONOTHIO- AND- DITHIOPHOSPHORIC ACIDS BY SPECTROSCOPY

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 5 May 83) pp 1252-1258

ISLAMOV, R. G., ZIMIN, M. G., ZABIROV, N. G. and PUDOVIK, A.N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] A study was performed of the structure of products of attachment of dialkylthio- and -dithiophosphoric acids, as well as diphenylthio- and -diphenyldithiophosphinic acids to N-acetyltrichloroacetalimine by IR spectroscopic methods. The possibility of tautomer equilibrium between the amide and imide forms, nature of homo- and heteroassociation and donor-acceptor properties of the phosphorylated amides were studied. The compounds were studied in the condensed phase, in nonpolar and polar proton and aprotic solvents at various temperatures. Association of the compound under all conditions results from intermolecular hydrogen bonds between P=O and NH, as well as C=O and NH groups. The monomer molecules of phosphorylated and thiophosphorylated amides are stabilized by 6- and 5-membered intramolecular hydrogen bonds with participation of NH and the phosphoryl or thiophosphoryl group, oxygen of the ester radical and the trichloromethyl group. Figures 2; references 4 (Russian).  
[330-6508]

## ELECTROCHEMICAL SYNTHESIS OF AMIDOPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84  
(manuscript received 4 Jul 83) pp 1262-1264

NIKITIN, Ye. V., ROMAKHIN, A. S., PARAKIN, O. V., IGNAT'YEV, Yu. A., ROMANOV, G. V., KARGIN, Yu. M. and PUDOVNIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] A study is made of anodic oxidation of  $(PO)_2PONa$  in the presence of secondary aliphatic amines  $R'_2NH$  in order to determine the possibility of electrosynthesis of compounds with the P-N bond. The polarization curves of oxidation of  $(RO)_2PONa$  show one clear wave at 0.60-0.65 V with a peak current corresponding to transfer of 0.40-0.45 electrons from the depolarizer molecule to the electrode. Preliminary oxidation of  $(RO)_2PONa$  in the presence of secondary amines at the potentials of the oxidation wave of  $(RO)_2PONa$  leads to synthesis of O,O'-dialky-N,N-dialkylamidophosphites with a yield of 30-32%. The products of phosphorylation of  $R'_2NH$  by dialkylphosphonium cations - O,O'-dialkyl-N,N-dialkylamidophosphates - are formed with the yield of only 5 to 10%, the yield of these compounds increasing with an increase in the excess of  $R'_2NH$  introduced to the reaction. The low yield of amidophosphates apparently results from preferential interaction of dialkylphosphonium cations with molecules of the initial  $(RO)_2PONa$ . Figure 1; references 3 (Russian).  
[330-6508]

UDC: 541.6

## PHOTOELECTRON SPECTRA AND ELECTRON STRUCTURE OF ORGANOPHOSPHORUS COMPOUNDS, PART 4: ENERGY AND COMPOSITION OF UPPER OCCUPIED ORBITALS OF PIV DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 29 Mar 83) pp 1265-1270

ZVEREV, V. V., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] A study is made of the ionization potential and composition of upper occupied orbitals of derivatives of 4-coordination phosphorus, phosphine oxides and phosphine sulfides. The experimental data on ionization potentials are presented, and photoelectron spectra of vinyl-diethylphosphine oxide, vinyl-difluorophosphine oxide and methyl-difluorophosphine oxide are described. The variation in ionization potentials of PIV derivatives as a function of the sum of ionization potentials of the hydrogen prototypes is determined. The first band in the spectrum of vinyl-diethylphosphine oxide showed no signs of splitting. This and analysis by the method of perturbations



indicate significant localization of  $p\pi(O)$  orbitals on the oxygen atom of the phosphoryl group. Figure 1; references 12: 10 Russian, 2 Western. [330-6508]

UDC: 547.341

#### INTERACTION OF CHLOROACETYLENEPHOSPHONATES WITH PRIMARY PHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 9 Dec 83) pp 1422-1423

LEONOV, A. A., TUZHIKOV, O. I., LOMAKIN, V. Yu., KOMAROV, V. Ya., DOGADINA, A. V., IONIN, B. I. and PETROV, A. A., Leningrad Technologic Institute imeni Lensovet

[Abstract] The placement of a halogen in chloroacetylenephosphonates with a tert-butylamino group is accompanied by prototropic isomerization with the formation of stable ketene iminophosphonate. The reaction with primary phosphines leads in contrast to formation of the substitution product of the halogen while preserving the  $C\equiv C$  and P-H bonds (I, R=t-Bu and II, R=adamantyl) Compounds I and II are formed upon interaction of equimolecular quantities of dimethylchloroethinephosphonate with primary phosphines with the hydrogen chloride formed carried away. Similar results are produced by interacting dimethylchloroacetylenephosphonate with adamantyl phosphine. The preservation of the phosphine structure apparently results from instability of isomer structures with 2-coordination phosphorus atom and C-P bond. The compounds produced are the first representatives of the secondary acetylene phosphines. References 3: 2 Russian, 1 Western. [330-6508]

UDC: 547.26'118

#### INTERACTION OF O,O-DIMETHYL-S-TRIMETHYLSILYLDITHIOPHOSPHATE WITH METHYLPHENYLCARBODIIMIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 6 Dec 83) pp 1423-1424

KUTYREV, G. A., LYGIN, A. V., CHERKASOV, R. A., and PUDOVNIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] For the first time, using methylphenylcarbodiimide as an example, the possibility is shown of interacting silyldithiophosphates with unsaturated compounds not containing an oxygen atom. O,O-dimethyl-S-trimethylsilyldithiophosphate (I) easily reacts with methylphenylcarbodiimide (II) in  $CCl_4$  to form thiophosphorylated thiourea (IV) and (VI). Study of this process by NMR and IR spectroscopy indicated that the first stage is

attachment of silyldithiophosphate at the most reactive C=NMe bond of heterocumulene. Migration of a thiophosphoryl group in the adduct leads to N-methyl-N-trimethylsilyl-N'-phenyl-N'-(O,O-dimethylthiophosphone)thiourea. NMR spectra are described. Thus, an amidothiophosphate structure is converted to a dithiophosphate which by transition of an Me<sub>3</sub>Si group to an N-phenyl center and subsequent regrouping forms a comparatively stable isomer adduct. References 3 (Russian).  
[330-6508]

UDC: 547.315

#### STABLE QUASIPHOSPHONIUM SALTS IN REACTIONS OF ALLENYLPHOSPHONATES WITH SULFOPHENYLCHLORIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 9 Dec 83) pp 1424-1425

KHUSAINOVA, N. G., NAUMOVA, L. V., BERDNIKOV, Ye. A. and PUDOVNIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] It was previously suggested that intermediate cyclic quasi-phosphonium salts are formed in the reactions mentioned in the title, further dealkylation of which by the chloride anion yields oxaphospholenes, alkenes and dienes. However, when sulfenyl chlorides are interacted with allenylphosphonium acid esters, the quasiphosphonium intermediate is not formed. When diethyl  $\gamma, \gamma$ -dimethylallenylphosphonate is added to the complex obtained from phenylsulfenyl chloride and SbCl<sub>5</sub> in an atmosphere of argon, gradual precipitation of crystals stable for 2 weeks at room temperature is observed. The spectral parameters and results of elemental analysis indicate the formation of 2,2-diethyl-4-phenyl-thio-5-dimethyl-1,2-oxaphosphol-3-ene-hexachloroantimonate. References 2: 1 Russian, 1 Western.  
[330-6508]

UDC: 546.18

#### N,N-BIS(TRIMETHYLSILYL)AMINO-N'-(DI-TERT-BUTYLPHOSPHINO)IMINOPHOSPHINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 25 Oct 83) pp 1425-1427

MARKOVSKIY, L. N., ROMANENKO, V. D. and KLEBANSKIY, Ye. O., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A description is presented of synthesis, some spectral and chemical properties of the first representative of the two-coordination phosphorus compounds with P=N-P bonds. N,N-bis(trimethylsilyl)amino-N'-(di-tert-butylphosphino)iminophosphines. The compound is stable for long

periods of time in argon; it has a low melting point. It is reddish crystalline orange substance which sublimates in a vacuum without decomposition, and is easily soluble in organic solvents. The structure was confirmed by NMR spectra, determination of molecular weight by cryoscopy and by the results of elemental analysis. The reactions of the compound with weakly-electrophilic reagents occur selectively at the three-coordination phosphorus atom, indicating high nucleophilicity of this atom in comparison with the two-coordination phosphorus atom. References: 3 Western.  
[330-6508]

UDC: 547.341

INTERACTION OF DI-*p*-BROMOPHENYL ESTER OF 2-PHENYLETHINYLPHOSPHONOUS ACID WITH C-*p*-FLUOROPHENYL-N-PHENYLNITRYLIMINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 6, Jun 84 (manuscript received 20 Feb 84) pp 1438-1439

PANEVIN, A. S., TRISHIN, Yu. G. and CHISTOKLETOV, V. N., Leningrad Technologic Institute of Cellulose-Paper Industry

[Abstract] Cyclical illides are suggested as the intermediate product in the interaction of diphenyl-2-phenylethynylphosphine and diethyl ester of 2-phenyl-ethynylphosphinous acid with C,N-diarylnitrylimines with the 3+3=6 cyclo-attachment mechanism with formation of cyclic phosphonium salts and phosphinates as the end products. The authors found that the cyclic illide is the end product of the interaction of di-*p*-bromophenyl ester of 2-phenylethynylphosphinous acid with C-*p*-fluorophenyl-N-phenylnitrylimine. Equimolar quantities of the initial substances in benzene were boiled in an atmosphere of argon for two hours, the triethylamine hydrochloride was filtered off and the solvent distilled away under reduced pressure. The cyclic illide (II) produced had mp 134-140°C and was contaminated by triethylamine or hydrochloride. The illide could not be separated in analytically pure form due to its extreme hydrolytic instability. The structure was confirmed by spectral data. Hydrolysis of the illide leads to a cyclical phosphonate which unambiguously confirms its structure. References 2 (Russian).  
[330-6508]

## REACTION OF SULFURIC ACID WITH ORGANOPHOSPHORUS COMPOUNDS CONTAINING beta-CHLOROSTYRYL GROUPS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 7, Jul 84 (manuscript received 10 May 83) pp 1481-1484

FEDOROVA, G. K., ANAN'YEVA, L. G. and YAKOVCHUK, O. A.

[Abstract] It has been previously shown that concentrated sulfuric acid reacts with organophosphorus compounds having a beta-chlorostyryl group to form the corresponding compound having a phenylacetyl group. Further study showed that this reaction may be used to prepare organophosphorus compounds having one, two or three phenylacetyl groups. In the present work concentrated sulfuric acid was reacted with bis(beta-chlorostyryl)phosphinic acid and with bis(beta-chlorostyryl)trichlorophosphorane and hydrolysed to form diphenylacetylphosphinic acid or its ring-forming products, 2,6-diphenyl-4-oxo-4-oxy-1,4-oxaphosphorine and bis-(2,6-diphenyl-4-oxo-1,4-oxaphosphorine-4-yl) oxide, depending on the ratio of reagents. Concentrated sulfuric acid reacts with beta-chlorostyrylphosphonic acid (or its acid chlorides) and with its diesters to form, respectively, phenylphosphonic acid or its diesters. References 6 (Russian).

[382-12765]

## REACTION OF ACETYLPHOSPHONATES WITH GEM-SUBSTITUTED VINYL PHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 7, Jul 84 (manuscript received 4 Jul 83) pp 1485-1489

AL'FONSOV, V.A., ZAMALETDINOVA, G.U., NIZAMOV, I.S., BATYYEVA, E.S. and PUDOVNIK, A.N., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov; Kazan Branch, USSR Academy of Sciences

[Abstract] Corresponding gem-substituted vinylphosphonates can be prepared by reaction of dialkylacetylphosphonates with trimethylchlorosilane, acetyl chloride, diethylchlorophosphite or diethyldithiochlorophosphite. In the case of trimethylchlorosilane, bis(dialkoxyphosphon)trimethylsiloxymethyl methanes are formed as secondary products. Apparently, when acetylphosphonates react with trimethylchlorosilane, the silicon atom is capable of electrophilic attack on either the carbonyl (preferably) or the phosphoryl group. Figure 1; references 10: 7 Russian, 3 Western.

[382-12765]

REACTIONS OF 2-PHENYL-5-METHYL-1,2,3-DIAZOPHOSPHOLE WITH 2-DIAZOPROPANE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 7, Jul 84 (manuscript received 8 Jun 83) pp 1511-1517

IL'YASOV, A.V., CHERNOV, A.N., NAFIKOVA, A.A., GALEYEVA, I.Z., DIANOVA, E.N. and ARBUZOV, B.A., Institute of Organic and Physical Chemistry imeni A.Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Data are presented on the structure of products resulting from the reaction of N-phenyldiazophospholes with 2-diazopropane. When 2-phenyl-5-methyl-1,2,3-diazophosphole was treated with 2-diazopropane, two crystalline compounds were formed. NMR spectra and radioisotopes were used to determine the structure of the compounds in solution. This proved to be identical to that obtained by X-ray analysis of the crystals. Figures 2; references 10: 4 Russian, 6 Western.  
[382-12765]

CATALYTIC AND THERMAL DECOMPOSITION OF 2-DIAZO-1,3-DIPHENYLPROPANE-1,3-DIONE IN DIMETHYLPHOSPHOROUS AND DIETHYLTHIOPHOSPHOROUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 54, No 7, Jul 84 (manuscript received 6 Jul 83) pp 1517-1520

ARBUZOV, B.A., POLOZOV, A.M. and POLEZHAYEVA, N.A., Scientific Research Chemical Institute imeni A.M. Butlerov of the Kazan State University imeni V.I. Ul'yanov-Lenin

[Abstract] Catalytic ( $\text{CuSO}_4$ ) and thermal decomposition of 2-diazo-1,3-diphenylpropane-1,3-dione in dimethyl or diethyl phosphorous acids results in the formation of dimethyl(1,3-dioxo-1,3-diphenyl)-2-propylphosphonate. IR and PMR spectroscopy show that the phosphonate exists in the diketo form in the crystalline state and as an equilibrium mixture of the ketonic and ionic forms of  $\text{CDCl}_3$  solution. Apparently, the phosphonate undergoes ring closure and the resulting alcohol reacts with the ketoketene to form the propionate. No phosphorus-containing products were obtained by thermal decomposition of the above diazoketone in the presence of dialkylphosphites or thiophosphites. References 9: 5 Russian, 4 Western.  
[382-12765]

## PESTICIDES

UDC 632.952

### FUNGICIDAL PROPERTIES OF COMPLEX LACTAM COMPOUNDS WITH HEAVY METAL SALTS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, Sep 84 pp 35-37

KUKALNEKO, S. S., doctor of chemical sciences; ANDREYEVA, Ye. I., doctor of agricultural sciences; SHESTAKOVA, S. I., candidate of chemical sciences; PRONCHENKO, T. S., FURSENKO, Ye. I., ALDOSHINA, T.V. and NOVIKOVA, K. F., candidates of agricultural sciences, All-Union Scientific Research Institute of Chemical Plant Protection Agents

[Abstract] In an attempt to enlarge the assortment of agricultural fungicides, a new class of chemical compounds was studied -- complexes of lactams with heavy metal salts:  $M[CO(CH_2)_nNR]_m \cdot X_2 \cdot pH_2O$ , where  $M = Cu, Zn, Mg, Hg$ ;  $X = Cl, Br, NO_2$ ;  $R = H, C_6H_5, CHOHCl_3$ ;  $n = 3-5$ ;  $m = 1-4$ ;  $p = 0$  or  $1$ . These compounds were obtained by refluxing the components for 1-5 hrs in ethanol. Mercurochlorides with  $n = 3$  or  $5$  (lactamananes) were found to be the most active seed digesting agents. These new mercury-containing preparations were rapidly degraded in soil and on a long term basis did not affect the soil microflora. Copper complexes exhibited high fungicidal activity against potato and tomato phytophthoras, powdery onion mildew and sugar beet mildew. The most effective agent was the monohydrate of tricaprolactamocopperdichloride (named cartocide). References 4 (Russian).  
[28-7813]

UDC 632.954:635.64

### HERBICIDES ON TOMATO PLANTINGS

Moscow KHIMIYA V SEL'SKOM KHOZYAYSTVE in Russian No 9, Sep 84 pp 37-39

ZHUKOVA, P. S., doctor of agricultural sciences, Belorussian Scientific Research Institute of Potato, Fruit and Vegetable Growing

[Abstract] The effect of herbicides in combination with agrotechnical measures on the weed content of the fields and productivity of tomato plantings was studied. Application of diphenamide (6-7 kg/hectare, 5-6 days prior to planting) lowered the weeds by 76-83% during the first count and by 53-61%

during the second count (20-25 and 50-55 days after application of herbicides, respectively). The duration and effectiveness of herbicidal activity increased upon combined application with sencor, trephlan and nitrophor. The seedlings planted on the herbicide soil must be healthy, at least 35-40 days old. Trephlon in doses of 1.5-2 kg/hectare, 5-6 days prior to planting lowered the weeds by 75-78% and 55-63% during the first and second count respectively; sencor's effect (0.75-1 kg/hectare) was 81-87% and 70-76% respectively. Nitrophor exhibited lowest effectiveness against weeds. Application of these herbicides did not affect the nutrient content in the soil and no toxic effect on tomato plants was noted. The yield of individual plants increased and the quality of tomatoes was not affected by these herbicides. References 3 (Russian).  
[28-7813]

UDC: 62-631.2:665.4:665.654.2

INCREASING EFFECTIVENESS OF OPERATION OF CATALYTIC REFORMING INSTALLATION

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 p 6

SHIPIKIN, V. V., PUSHKAREV, V. P. and GEORGIYEVSKIY, V. Yu., "Lenneftekhim"  
Scientific Production Association

[Abstract] The antiknock properties of refined gasoline can be improved by selective hydrocracking. A new version of refining is suggested in which the catalytic reforming installation treating the 62-140°C boiling fraction is equipped with a unit for selective hydrocracking. The gas product mixture passes through the selective hydrocracking unit downstream from the reforming reactors and normal C<sub>6</sub>-C<sub>8</sub> paraffin hydrocarbons are cracked, increasing the octane number by 18-20. The production of aromatic hydrocarbons remains at the same level as with older processes, motor vehicle gasoline production is reduced slightly, the flow of catalysate reaching the aromatic hydrocarbon extraction unit is decreased by approximately 10%. The combined processes of catalytic reforming and selective hydrocracking can thus significantly improve the variety of commercial gasoline produced and decrease the cost of production of aromatic hydrocarbons. References 2 (Russian).  
[334-6508]

UDC: 662.753.1

PREPARATION OF RAW MATERIALS FOR REFORMING AND PYROLYSIS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 7-8

AKHMETOV, A. F., TANATAROV, M. A., KHURAMSHIN, A. Z. and MANSUROVA, T. A.,  
Ufa Petroleum Institute

[Abstract] One method of decreasing the consumption of scarce hydrocarbon raw materials and decreasing the cost of production by ethylene is preliminary fractional distillation of straight-run gasoline, subsequent utilization of the light gasoline fractions as pyrolysis raw material, the heavier fractions as reforming raw material. This article studies the



results of the processes of pyrolysis and reforming when these different raw materials are used. A version for processing of gasoline fractions by pyrolysis and reforming has been developed which allows production of commercial grade gasoline without involving high octane low-boiling components in the process. Low octane gasoline fractions are best used as a raw material for pyrolysis, and are unsuitable as raw materials for reforming. An effective means of increasing the selectivity of the processes and decreasing the consumption of raw materials is preliminary fractionation of the gasoline using the light and middle fraction for pyrolysis, the heavier fractions for reforming. Figures 3; references 4 (Russian).  
[334-6508]

UDC: 665.761.6

#### PRODUCTION OF WHITE COMPRESSOR OIL TYPE NKM-40 FROM WESTERN SIBERIAN PETROLEUM

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 11-12

MARCHEVA, Ye. N., POTANINA, V. A. and FUKS, G. I., (deceased), All-Union Scientific Research Institute for Oil Refining

[Abstract] A study was made of neutral oil from the production of sulfonate additives from Western Siberian petroleum in order to expand the resources of raw material for the production of white compressor oil. The oil contains 7.75% aromatic hydrocarbons by weight and has a specific dispersion of 102, indicating the need for further purification with oleum in order to produce white oil with the required degree of dearomatization. Vacuum distillation was used to increase viscosity and it was found that the residue boiling over 420°C is a suitable raw material with the required viscosity for white compressor oil. The studies showed that production of white oil with specific dispersion 97 which passes the test for presence of organic impurities requires that the raw material be purified with 15% oleum in 3 stages. Figure 1; references 8: 3 Russian, 5 Western.  
[334-6508]

UDC: 66.097.3+665.64

#### INFLUENCE OF RAW MATERIAL QUALITY ON CATALYTIC PYROLYSIS RESULTS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 15-17

KREYNINA, G. P., IZBYAKOVA, L. A. and ADEL'SON, S. V., Moscow Institute of Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] The results of catalytic pyrolysis and distribution of its major products are influenced not only by the group hydrocarbon composition of

the raw material but also by its content of organic compounds containing sulfur, oxygen, nitrogen and metals. A study was made of the influence of compounds containing sulfur, nitrogen and metal in n-hexadecane on catalytic pyrolysis results. Experiments were performed on a laboratory installation in a quartz reactor in a stationary catalyst layer. The values of rates of elementary stages obtained indicate that inhibition of catalytic pyrolysis in the volume in the presence of hydrogen sulfide is not possible. Earlier reports on the influence of sulfur on the pyrolysis process are contradictory. The authors believe that the inhibition of the decomposition of n-hexadecane by sulfur results from the interaction of HS radicals with the surface of radical-like compounds. Deposition of nickel on catalysts from porphyrins occurs quite slowly as a result of decomposition of most of the porphyrin before the raw material enters the reaction zone during heating to 250°C or higher. Sulfur-containing additives inhibit the decomposition of paraffin hydrocarbons in pyrolysis in the presence of a catalyst, but decrease the yield of coke. Nitrogen-containing additives have no influence on catalytic pyrolysis. Precipitation of even 0.005% nickel helps to increase the yield of coke by a factor of 1.5. References 9: 6 Russian, 3 Western.

[334-6508]

UDC: 665.765+621.892

#### INFLUENCE OF CARBOXYLATION CONDITIONS ON COMPOSITION OF ALKYSALICYLIC ACIDS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 19-21

VOLOSHIN, N. L., GORDASH, Yu. T., ALDOKHINA, T. F. and VYKHRESTYUK, N. I., All-Union Scientific Research, Planning and Design Institute of Petrochemistry

[Abstract] Carboxylation products were obtained on an industrial installation under various continuous operating conditions. Studies were performed for products which deviated from the standard conditions either in reaction time or temperature or both. The carboxylation product was concentrated for mass spectrometric and liquid chromatography studies. The capabilities of the methods were evaluated based on the distribution of intensities of molecular and characteristic ion peaks. The mass spectrometric method was found to yield significant quantities of information and to be suitable for analysis of the composition of alkylsalicylic acids. Figures 2; references 6: 4 Russian, 2 Western.

[334-6508]

## THIOCARBAMIDE DERIVATIVES OF 2,6-DI-TERT-BUTYLPHENOL -- REACTIVE FUEL STABILIZERS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 24-26

GOLUBEVA, I. A., SHAULOV, V. S. and VISHNYAKOVA, T. P., Moscow Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] A study is made of the influence of structure of dithiocarbaminic acid derivatives, based on 2,6-di-tert-butylphenol, on the effectiveness of their antioxidant action in reactive fuels. Various derivatives of dithiocarbaminic acids containing sterically-hindered 2,6-di-tert-butylphenol fragments were synthesized. The antioxidant effectiveness of the derivatives was estimated by 12 times heating to 120°C and oxidation of the fuels in a closed volume at 150 and 180°C. The results of testing of T-6 fuel with the inhibitors indicated varying antioxidant qualities of the various substances. Symmetrical and asymmetrical di- and tri-substituted thiocarbamide, thiosemicarbazide and dithiocarbaminic acid esters have the greatest inhibiting effect. Some di-substituted symmetrical and asymmetrical thiocarbamides, thiosemicarbazides and thiocarbohydrazides have significantly greater antioxidant effect than does ionol. References 6 (Russian). [334-6508]

UDC: 620.197.3

## EFFECTIVENESS OF CORROSION INHIBITORS IN RECYCLED WATER SUPPLY SYSTEMS

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 37-39

SOROCHENKO, V. F., SHUT'KO, A. P., PAVLENKO, N. I. and BUKOLOVA, T. P., Kiev Polytechnic Institute

[Abstract] Water soluble inhibitors antikor, IKB-4V, sodium nitrite and tripolyphosphate were studied as corrosion inhibitors in recycled water supply systems. Neither sodium nitrite, antikor nor IKB-4V proved to be highly protective in water purified by a coagulant which reduced the pH of the water by 1.5-2 points, thus increasing corrosion rates of metals. Sodium tripolyphosphate did manifest stable protective properties under the same conditions. The bactericidal properties of sodium tripolyphosphate were also superior to the other substances. At the temperatures of recycled water in oil refineries, hydrolysis of sodium tripolyphosphate is insignificant. Sodium tripolyphosphate is thus the most suitable of the inhibitors tested. References 11: 10 Russian, 1 Western. [334-6508]

## COKING OF REFORMING CATALYSTS IN INDUSTRIAL INSTALLATIONS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 7, Jul 84 pp 40-41

SKIPIN, Yu. A. and FEDOROV, A. P., "Lenneftekhim" Scientific Production Association

[Abstract] The purpose of this work was to determine the regularities of coking of reforming catalysts under industrial conditions. The coking rate of AP-64 catalysts was studied on an L-35-11/600 installation, the reactors of which have devices for sampling the catalyst without shutting down the process. The distribution of coke over the length of the layer of KR-106 industrial polymetallic catalyst was studied in a pilot scale installation with three adiabatic reactors. Long runs (1200 and 3600 hours) were used. It was found that to increase the duration of operation of installations between regeneration, the rigidity of the process in the head reactors must be increased, decreasing in subsequent reactors. This can be done by decreasing the input temperature of the last reactor while increasing it in the heat reactor. Figures 2; references: 6 Russian.  
[334-6508]

## COMPOSITION OF RAFFINATES OF ADSORPTION REFINED HYDRAULIC OIL BASES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 29-31

ALEKHINA, N. I., LEVINSON, S. Z., KURITSINA, N. I. and BELAN, G. B., All-Union Scientific Research Institute for Oil Refining

[Abstract] With the rise in production of thickened hydraulic oil VMGZ for use in northern regions, the quantity of secondary products also rose. This is due to the downgrading in chemical composition of Ural sulfur crudes, the traditional source for the low viscosity base in VMGZ oil. In recent years the content of aromatic hydrocarbons subject to removal from the base oil increased to 1.5 times. This brought about more extensive refining and a higher yield of desorbed raffinate. Qualified use and improved production of VMGZ base oil thus requires more extensive research on the chemical composition and physical chemical properties of these products. A study of desorbed raffinates from the first and second stages of adsorption refining of a 1981 sample shows that the second stage product contains half as much naphthenic-aromatic hydrocarbons and sulfur compounds and somewhat more aromatics. The first stage product has high naphthene and organic sulfur content. Thus, the two-stage adsorption refined raffinates of VMGZ hydraulic oil consist of low pour point, low viscosity aromaticized products. References 4 (Russian).  
[374-12765]

## LOW TEMPERATURE VISCOSITY OF DOMESTIC MOTOR OILS BY NEW CLASSIFICATION SAE J 300e

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 35-36

BAUMAN, V.N., KOZHEKIN, A.V. and KOPYSSKIY, P.V.

[Abstract] The new foreign classification system for motor oils based on viscosity SAE J 300e, introduced in 1982 to the western world, differs significantly from the previous SAE J 300d. Where the latter regulated only two factors, viz. the viscosity of winter and all-season oils at  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) and viscosity of all motor oils at  $100^{\circ}\text{C}$ , the new classification has three indices: viscosity at  $100^{\circ}\text{C}$  for all oils, viscosity at low temperatures and the "pumpability" limit temperature for winter and all-season oils. Abroad, viscosity at low temperatures is determined with a Cold Cranking Simulator (CCS) viscosimeter by a modified method (ASTM D 2606) at  $5^{\circ}$  intervals. While GOST 17479-72 "Motor Oils. Indexing by Group" lists viscosities at  $100^{\circ}$  and  $-18^{\circ}\text{C}$  and gives approximate data correlating foreign and domestic oils, introduction of SAE J 300e classification makes it necessary to make corresponding changes in the above GOST. Domestic winter and all-season oils were evaluated on the CCS viscosimeter and their classification by SAE J 300e given in a table. The new system makes it possible to classify oils under more realistic operating conditions, especially starting properties. References 5: 2 Russian, 3 Western.

[374-12765]

## p-CHLOROTHIOMBENZAMIDES AS LUBE OIL ADDITIVES

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 42-43

KULIYEV, A.B., KURBANOV, M.M., KULIYEV, F.A. and ALIYEV, F.Yu., IKhP (expansion unknown) AzSSR Academy of Sciences

[Abstract] It was previously shown that various thiocarboxylic acid amides are effective as lube oil additives. In the present work, 9 derivatives of p-chlorothiobenzamide were synthesized, tested and compared with N-propylthiobenzamide in lube oil DS-11, and with additive INKhP-21 in lube oil TB-20 for anticorrosion and thermooxidative activity in the former and anti-scoring in the latter. The results show that p-chlorothiobenzamides are more effective additives than thiobenzamides. References 4: 3 Russian, 1 Western.

[374-12765]

## OBTAINING LIGHT FUELS BY HYDROCRACKING BITUMINOUS HIGH SULFUR CRUDES

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 p 8

KATSOBASHVILI, Ya.R. and TEPLYAKOVA, G.A., Institute of Petrochemical Synthesis, USSR Academy of Sciences

[Abstract] A method is described for refining high sulfur bituminous crudes by low pressure hydrocracking over a stationary bed aluminum-nickle-molybdenum catalyst with periodic regeneration of the latter. The crude, diluted in 2:1 ratio with a recirculate, was mixed with hydrogen, preheated to 280-290°C and fed into a reactor for 120 minutes. Optimal conditions for maximum yield of liquid products and minimal coke formation were determined experimentally. After hydrofining, the diesel fraction may be utilized as a low sulfur diesel fuel, and the heavy residue as a low viscosity boiler fuel or as a recirculate feed stock to increase motor fuel yield. The gasoline fraction has an octane number of 58.7 (motor method). References 4 (Russian).  
[374-12765]

## FILTERABILITY OF OILS FOR HYDRAULIC SYSTEMS IN INDUSTRIAL EQUIPMENT

Moscow KHIMIYA I TEKHNLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 15-17

CHESNOKOV, A.A., ANTIPINA, N.A., NIKOL'SKAYA, O.N. and SHACHIN, A.I., All-Union Scientific Research Institute for Petroleum Products

[Abstract] The use of fine filters in hydraulic systems raised the significance of oil properties such as filterability. Results are presented of a comparative study of the filterability of three groups of 10 domestic and foreign hydraulic fluids having viscosities of 12, 20 and 20 mm<sup>2</sup>/sec. at 50°C. Analysis shows that tars and tar-like products, settling on the surfaces and inside the pores of the filter material, have a negative effect on the filterability of both pure and blended oils. Filterability may be improved by reducing the content of these substances in both the base components and the additives. Figures 3; references 4 (Russian).  
[374-12765]

## STABILITY OF REGENERATED OIL I-20A AGAINST OXIDATION

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 20-21

FAL'KOVICH, M.I., POPOVA, N.N., YEVDOKIMOV, A.Yu., LEBEDEV, V. S., KUZ'MINA, N.A. and LINNIKOVA, O.P., Moscow Order of Labor Red Banner Institute of Petrochemical and Gas Industry imeni I.M. Gubkin

[Abstract] Ageing of oils is related to the consumption of natural inhibitors and imparting the oil with an antioxidant capacity which determines the number of oxidation linkages torn apart by the natural inhibitors present in the oil. Antioxidant capacity is a quantitative characteristic of an oil's state of oxidation in its early stages and determines the final stage of condensation to form residues. A study of oil I-20A shows that natural inhibitors condense into gums (antioxidant capacity  $3.43 \cdot 10^{-1}$  mole/liter) and an intermediate aromatic fraction which contains a concentrate of organic sulfur compounds and provides the oil with a reserve antioxidant capacity. Analysis shows that on ageing, newly formed antioxidants accumulate in oil I-20A and increase its antioxidant capacity to a constant value. Regeneration of spent oil should therefore be carried out in such a manner as to preserve those compounds which provide resistance to oxidation. Figures 2; references 4 (Russian).  
[374-12765]

UDC 542.943:541.128:552

## FEATURES OF OXIDATION OF FUELS IN CONTACT WITH ROCKS

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 22-24

AZEV, V.S. and KUZNETSOVA, L.N.

[Abstract] Prevention of oxidation is one of the problems in storing fuels in contact with minerals such as rock salt, lime, dolomite, anhydrites, gneisses and crystalline shale. These minerals also contain aluminosilicates which are heterogeneous catalysts and accelerate the oxidation of hydrocarbons to hydroperoxides. The rate of oxidation increases with the surface area of the mineral in contact with the fuel. Data on the oxidation of T-1 jet fuel and hydrofined diesel fuel L in contact with rock salt support a heterogeneous oxidation mechanism. A five stage mechanism for heterogeneous acceleration of fuel oxidation is presented. Figures 2; references 8: 6 Russian, 2 Western.  
[374-12765]

UDC: 66.066:547.392.002.68:62-404.278

LIQUID MEMBRANE SEPARATION OF LOW-MOLECULAR-WEIGHT MASS CHLORO-ORGANIC COMPOUNDS FROM POLYMER SUBSTANCES IN WASTES FROM PRODUCTION OF CHLOROPRENE FROM BUTADIENE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 37, No 5, May 84  
(manuscript received 2 Jun 83) pp 323-328

GRIGORYAN, G. S., ASATRYAN, E. M., MALKHASYAN, A. Ts. and MARTIROSYAN, G. T., "Nairit" Scientific-Production Association, Yerevan

[Abstract] Chloro-organic wastes consisting primarily of chloroprenes, dichlorobutene and polymers are formed in the production of chloroprene from butadiene. Selective permeation of the substances through a liquid membrane formed by a surfactant and water is a very effective method of separation of the organic waste compounds. To determine the optimal conditions for separation, the influence of the quantity of surfactant was studied and it was found that without surfactant, diffusion of low molecular weight compounds is only 7%. When sodium pentadecylsulfate is used, diffusion increases rapidly but selectivity decreases when the surfactant is present at more than 0.005 weight parts to one weight part of water. Surfactants tested in order of decreasing effectiveness are sodium pentadecylsulfate, sodium dodecylsulfate, sodium salt of condensation of two-naphthalene sulfoacid with formaldehyde, saponin, n-decyl alcohol, n-butyl alcohol, C<sub>10-18</sub>-alkyl dimethylbenzylammonium chloride. The extracted substances can be easily and quantitatively separated from the solvent by distillation and the solvent reused with undiminished effectiveness. References 3 (Russian).  
[3460-508]



## COPOLYMERIZATION OF STYRENE WITH DIVINYLBENZENE IN INITIAL STAGES

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 5-7

MARKOVSKAYA, R.F., ALEKSEYEVA, Ye.S., YELAGIN, G.I., YANCHUK, A.N.,  
SAVENKOV, V.I. and IL'ICHEV, S.N.

[Abstract] The mechanical and osmotic properties of ion exchange resins depend on the quality of the matrix, which is frequently styrene-divinylbenzene copolymer. A study was made of the effects of the initiator on the kinetics and thermodynamic parameters of copolymerization of styrene with technical grade divinylbenzene at various temperatures using benzene peroxide, cumyl hydroperoxide, tert-butyl perbenzoate and polymeric sebacic acid peroxide as initiators. In the initial stages of the copolymerization monomer, conversion is a linear function of time. With increasing initial content of initiator, the polymer yield increases for the same time period. Entropy, ethalpy and free energy of activation were computed for the transitional state of the initiation reaction. Data show that at the same temperature, copolymerization is most rapid with sebacic acid peroxide as initiator, while that of benzoyl peroxide, cumyl peroxide and tert-butyl perbenzoate was 1.5, 3-5 and 9-10 times less rapid, respectively. The results make it possible to select an initiator and the amount needed for suspension copolymerization at any given temperature. Exceeding the optimum polymerization rate results in poor quality granules for ion exchange resins. Figure 1; references 8: 4 Russian, 4 Western.

[375-12765]

UDC 678.5:66.095.262.541.64:547.538.141

## WATER-DISPERSED POLYMERIZATION OF STYRENE IN PRESENCE OF CALCIUM CARBONATE AND SURFACTANTS

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 9-10

IVANOV, A.A., PEBALK, A.V., FEDOROVA, I.Yu. and PRAVEDNIKOV, A.N.

[Abstract] Addition of fillers during water-dispersed polymerization appears to be promising. A study was made of some features of water-dispersed polymerization of styrene with calcium carbonate as filler and various surfactants as emulsifiers. Two percent aqueous polyvinyl alcohol gave a stable system resulting in over 90% monomer conversion without phase separation. Granulometric composition of monomer and particle macrodrops with sodium persulfate as initiator depends on the  $\text{CaCO}_3$  content. Oxyethylated cetyl alcohol was also a good stabilizer, although the process slows down in the presence of persulfate initiator. Sodium alkylsulfonate, a typical ionic emulsifier, did not provide a stable system by itself, but addition of 0.05% polyvinyl alcohol markedly improved the stability. Figures 2; references 4: 2 Russian, 2 Western.

[375-12765]

## POLYMERIZATION OF MMA IN PRESENCE OF SULFUR- AND SILICON-CONTAINING COMPOUNDS

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 11-12

STAVROVA, S.D., CHIKHACHEVA, I.P., YEFREMOVA, Ye.P. and PRAVEDNIKOV, A.N.

[Abstract] Autoacceleration during polymerization of vinyl monomers subject to gel-effect may be prevented by increasing the reaction rate in the initial stage of the reaction or by lowering it later at the gel-effect stage. Use of compounds capable of both intensifying and, later on, slowing down the polymerization are the most promising. Results are presented of a study on methylmethacrylate (MMA) polymerization in the presence of thiophenol and diphenylsulfide. MMA polymerization initiated with lauryl peroxide is increased slightly with addition of the above reagents. IR-spectra indicate that these compounds activate peroxide decomposition, but to a lesser degree than tertiary amines. The rate of gel formation decreases due to the lower reaction rate in the later stages of the process. A study of the effects of methylphenylsilane on MMA polymerization shows that this compound also decreases the polymerization rate of the gel-formation stage. The properties of the reagents studied decrease in the order:  $S > Si \geq N$ . Figures 2; references 4: 3 Russian, 1 Western.  
[375-12765]

## EFFECT OF STRUCTURE OF ABS-M COPOLYMERS ON PROPERTIES

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 16-17

DOKUKINA, L.F., VYLEGZHANINA, K.A., SADIKOV, B.G. (deceased), DERYAGINA, G.M., GAVRICHENKOVA, E.A. and NOSKOVA, N.A.

[Abstract] A study was made of relationship between structure and properties of ABS-M (alkylbenzene sulfonate copolymer prepared by bulk polymerization). This copolymer differs from ABS-3 (prepared by emulsion polymerization) by having larger particle size in the elastomer phase and the presence of SAN [expansion unknown] copolymer occlusions. The results show that for optimum correlation of impact viscosity to relative elongation with rupture at 7-12% elastomer content, it is necessary to have 25-30% content of particles exceeding 2 mcm. Figure 1; references 6: 1 Russian, 5 Western.  
[375-12765]

## EFFECT OF PLASTICIZERS ON THERMOSTABILITY OF PVC-COMPOSITES

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 20-21

GRYZHENKOVA, N.S., MARKINA, V.K. and NEZVANKINA, T.V.

[Abstract] The effects of adding dibutyl and dioctyl phthalates, as plasticizers, on the thermostability of PVC containing various stabilizers were studied. A 1:1 mixture of these plasticizers was found to be the most effective one in raising the thermostability of pure PVC. Rigid PVC materials are most effectively stabilized with a mixture of lead silicate and calcium stearate, while PVC composites are best stabilized with a mixture of SKS-K-11, forstab K-201 and epoxidated soya oil (composition No 8). The results indicate that the toxic lead silicate - calcium stearate plasticizer can be replaced with the less toxic composition No 8 in the production of soft PVC materials. References 4 (Russian).  
[375-12765]

## EFFECT OF ACTIVATED OXYGEN ON EROSION OF POLYMER FILMS

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 23-25

BAGIROV, M.A., GORBUNOV, A.M., ALIMARDANOV, R.S., MALIN, V. P. and OSKOLONOV, V. A.

[Abstract] Polymeric composite materials have many advantages over glass fiber filled materials, such as higher impact resistance, lower density and low cost so that they are widely used. Activated oxygen (partially dissociated to atoms) rapidly erodes polymer films and it can be used to machine them. A study was made of the weight change of polystyrene, polyvinyl chloride and polystyrene composite films having varying amounts of PVC (0.05 to 15%) after treatment with activated oxygen. Erosion is shown to be a linear function of time with the rate depending on the composition and thickness of the film. Figures 2; references 4 (Russian).  
[375-12765]

POLYMER COATINGS, HARDENED BY RADIATION

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 29-31

ZAGORSKAYA, Z.G., MASLOVA, Ye.V., DEYEV, Yu.S., SAPOZHNIKOVA, Ye.L.,  
MIKHAYLOVA, Z.V. and SHABADASH, A.N.

[Abstract] One problem in using unsaturated polyester coatings hardened by ionizing radiation is finding a sufficiently reactive polyester composition which is not inhibited by air oxygen during the hardening process. While styrene-containing compositions can be hardened, they are toxic and present fire and explosion hazards. In the present work a study was made of the possibility of using maleic anhydride, ethylene glycol and chlorendic anhydride with oligoestermethacrylates TGM-3 and MGF-9 as cross-linking agents. The results are presented as a basis for developing a non-styrene polyester composition for radiation-hardened coatings on wood. Figures 2; references 3 (Russian).

[375-12765]

UDC [678.073:621.7].620.169.1

INCREASING WORK CAPACITY OF STRESSED PARTS OF THERMOPLASTICS BY PRELIMINARY PRESSURE TREATMENT

Moscow PLASTICHESKIYE MASSY in Russian No 8, Aug 84 pp 38-40

YARTSEV, V.P. and MINKIN, Ye.V.

[Abstract] Plastic parts for automobiles such as fenders, roofs and hoods are now made by punch pressing from panels, while fastenings such as bolts, pins and nuts are punch pressed from bulk. One of the great advantages of cold working is the increased strength of the parts resulting from the cold pressing or pressure treatment. A study was made on the effects of thermoplastic reinforcement by pressure treatment on their resistance to mechanical wear. The results show that introduction of additives such as polycarbonates or polyamides to low pressure polyethylene has no appreciable effect on the wear rate, but pre-treatment by pressure markedly reduces it. This is important in the production of bearings. Orientation of surface layers following punch pressing from bulk results in higher resistance to shear stress, which is important for threaded fastenings. Figure 1; references 12: 10 Russian, 2 Western.

[375-12765]

UDC: 621.039.7.13:621.395.623.77

MEMBRANE METHODS OF SEPARATING RADIOACTIVE NOBLE GASES, PART 1: INFLUENCE OF IRRADIATION ON PERMEABILITY AND SELECTIVITY OF SEPARATION OF NOBLE GASES BY ASYMMETRICAL POLYMER MEMBRANES

Leningrad RADIOKHIMIYA in Russian Vol 26, No 3, May-Jun 84 (manuscript received 2 Dec 82) pp 332-336

NIKONOV, V. N., KAZANKIN, Yu. N., BOZHENKO, Ye. I., BUNTSEVA, I.M., MAKHMUTOV, F. A., TEPLYAKOV, V. V. and BEKMAN, I. N.

[Abstract] A study is presented of the possibility of using domestic asymmetrical membranes for extraction of  $^{85}\text{Kr}$ . Primary attention is given to determination of inert gas transfer parameters through the polymer materials used in membrane technology, since this allows evaluation of the suitability of various membranes. The variation of permeability and selectivity as a function of radiation dose and temperature are studied. Stable inert gases, helium, argon, krypton and xenon, radioactive  $^{85}\text{Kr}$ , nitrogen and oxygen were used in the studies. The permeability of asymmetrical membranes of polyvinyltrimethylsilane and an arylate-siloxane block copolymer were measured as a function of radiation load. The results of radiation resistance of polymer membranes of various types confirm a known rule of radiation chemistry: linear polymers are cross linked by radiation and their mechanical properties slightly improved, while branch polymers are destroyed by radiation. References 11: 6 Russian, 5 Western.  
[331-6508]

## MEMBRANE METHODS OF SEPARATING RADIOACTIVE NOBLE GASES: PART 2: STUDIES OF DIFFUSION AND PERMEABILITY ON INERT GASES AND COMPONENTS OF AIR THROUGH FILMS BASED ON POLYDIMETHYLSILOXANE

Leningrad RADIOKHIMIYA in Russian Vol 26, No 3, May-Jun 84 (manuscript received 19 Nov 82) pp 337-341

BEKMAN, I. N., BOZHENKO, Ye. I., IYEVLEV, A. L., KAZANKIN, Yu. N., NIKONOV, V. N., TEPLYAKOV, V. V. and SHVYRYAYEV, A. A.

[Abstract] The purpose of this work was to measure the coefficients of permeability, diffusion and, indirectly, solubility of inert gases, nitrogen, oxygen, methane, carbon dioxide and hydrogen as the major components of gas emissions in the polymer material silar, an aryate dimethylsiloxane block copolymer. Studies were performed on homogeneous films produced by pouring on cellophane of 3% solutions of silar in methylene chloride, thickness 956 and 1275  $\mu\text{m}$ . The gas permeability characteristics of silar and polydimethylsiloxane (PDMS) were measured and compared. As the content of the polyarylate block increased, the permeability of silar for all gases studied decreased with respect to pure PDMS. P and D of the gases in the polyarylate were significantly less than the comparative figures in PDMS. The selectivity of gas permeability of silar is determined by the properties of the siloxane components, the gas permeability coefficients decrease by a factor of 2 to 3 in comparison to pure PDMS as the fraction of the polyarylate block is increased to 46 weight parts. The film-forming properties of silar allow production of asymmetrical membranes with effective working layers of submicron dimensions, in contrast to PDMS films with a thickness of several tens of microns, more than compensating for the loss of gas permeability properties of the polymer membrane material. Figures 3; references 7: 4 Russian, 3 Western.  
[331-6508]

UDC: 678.074.048(0.888)

KINETIC REGULARITIES OF INHIBITED OXIDATION OF POLYISOPRENE RUBBER

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA: KHIMIYA in Russian Vol 25, No 3, May-Jun 84 (manuscript received 26 Jan 83) pp 305-308

BEBIKH, G. F., KLEYMENICHEV, Vl. P. and SARAYEVA, V. P., Department of Chemical Technology

[Abstract] This work studied the kinetic regularities of thermal oxidation of polyisoprene rubber in the presence of new polyfunctional high-molecular-weight inhibitors including amine, phenol and phenol-amine groups in their macromolecules. The kinetics of oxidation of rubber stabilized with low-molecular-weight antioxidants of amine and phenol types was also studied. Oxidation kinetics were studied on a thermal oxidation installation in a chamber of oxygen at 130-250°C, oxygen pressure 1 atm. Kinetic curve analysis indicated that the oxidation of rubber is most correctly described by a reaction at a phase division boundary. For the high-molecular-weight inhibitors, the Arrhenius equation is not accurate throughout the entire range of temperatures studied. There are several areas in which the oxidation rates change suddenly. This indicates that the process of oxidation of rubber stabilized by these inhibitors occurs by different mechanisms in different temperature areas. It is thought that this anomalous inhibition results from chemical transformations occurring in the macromolecules of the inhibitors during thermal oxidation. Analysis of mass spectra of the inhibitors showed that at 170-220°C the inhibitors undergo thermal breakdown, dropping low-molecular-weight fragments which can interact with the molecular oxygen and polymer macroradicals. The activity of the high-molecular-weight inhibitor is somewhat lower than that of some low-molecular-weight inhibitors at 130 to 160°C, but at 190 to 250°C is significantly higher than all low-molecular-weight inhibitors. Figures 2; references 5 (Russian).  
[327-6508]

# VULCANIZATION OF FLUORORUBBERS WITH PEROXIDES COMBINED WITH TRIALLYLISOCYANURATE

Moscow KAUCHUK I REZINA in Russian No 9, Sep 84 pp 16-18

SANKINA, G. A., SMIRNOVA, N. P., SOROKIN, G. A. and DONTSOV, A. A.,  
Scientific Research Institute of Rubber Industry

[Abstract] An attempt was made to increase the effectiveness of peroxide vulcanization of domestic fluororubbers SKF-26 and SKF-260 by addition of triallylisocyanurate (TAIC). The following peroxides were used: benzoyl (BP), cumyl (CP),  $\alpha, \alpha'$ -di(tert-butylperoxyisopropyl)benzene -- peroximone (P), and 1,4-di(tert-butylperoxy)-1,1,4,4-tetramethylbutane -- varox (V). It was shown that addition of TAIC to the vulcanizing composition increased substantially the effectiveness of this process. The properties of the vulcanizates based on SKF-260 varied with the peroxide used: those with PC surpassed the diphenol vulcanizates, those with PB were the poorest. Improvements were noted in relative strength, elongation, swelling and aging properties. Specific study parameters for the combination of various peroxides with SKF-26 and SKF-260 were reported. Overall, it was shown that the peroxides PC, P and V combined with TAIC could be used as vulcanizing agents for SKF-260. The PC was the best agent for this purpose. Figures 4; references 4: 2 Russian, 2 Western.

[14-7813]

# COMPOSITION SELECTION FOR CONDENSATION OF RESINS USED IN GEOPHYSICAL INSTRUMENTS FOR EXTREMELY DEEP PETROLEUM AND GAS WELLS

Moscow KAUCHUK I REZINA in Russian No 9, Sep 84 pp 18-20

FRENKEL', R. Sh., ZALESSKAYA, A. D., SHVETSOV, V. A. and STOLYAROVA, L. I.,  
VNIKTIRP [expansion unknown]

[Abstract] In recent years, due to the introduction of extremely deep drilling techniques, the need for technical rubber components (TRC) for geophysical instruments increased substantially. Available literature data were reviewed listing a number of technical properties of various rubbers used to prepare TRC. Analysis of these data showed that TRC based on SKN-18, obtained in presence of copper sulfate, and its combination with peroxide, assured hermetic sealing of the instruments at 200-250°C in aqueous and petroleum media when  $H_2S$  was absent. The rubbers based on the combination of ethylenepropylene rubbers (EPR)-polyacrylonitrile-oligoetheracrylate performed well at 200-250°C in water and in low petroleum admixtures and those based on EPR-fluororubber were good performers in both water and petroleum. In media containing hydrogen sulfide the following mixtures could be used:



EPR-polyacrylonitrile-oligoether and grated EPR-fluororubber. These materials lasted for 1-3 work cycles. References 8: 7 Russian, 1 Western. [14-7813]

UDC 629.113.012

# NATURE OF SIDE FORCE GENERATED DURING ROTATION OF INCLINED AUTOMOBILE WHEELS

Moscow KAUCHUK I REZINA in Russian No 9, Sep 84 pp 24-26

NOVOPOL'SKIY, V. I. and BAYDUKOV, A. A., Scientific Research Institute of Tire Industry; Chelyabinsk Military Automobile Engineering University imeni P. A. Rotmistrov

[Abstract] A theoretical analysis was carried out of the interaction of an inclined automobile wheel with the road. It was shown that the side force of such wheels is a resultant of two components originating from the tilting movement of the inclined wheel and the tendency of such inclined wheel to run with the side carry off in the direction of the inclination. All other conditions being equal, the presence of an elastic tire leads to a significant (15-60%) decrease of the side force of an inclined wheel in comparison to a solid one. A formula was derived for the calculation of side force of an inclined rubber tire. Individual parameters of this function were determined experimentally on testing stands. Figures 4; references 7 (Russian). [14-7813]

## WATER TREATMENT

UDC 628.335:628.34

### DECONTAMINATION OF EFFLUENTS FROM ALUMINA-SILICA CATALYST PRODUCTION

Moscow KHIMIYA I TEKHOLOGIYA TOPLIV I MASEL in Russian No 8, Aug 84 pp 38-40

YUNUSOV, M. P., AZIMOVA, T., FAYZIYEVA, Z. and ABDRAHIMOV, I.I.,  
VNIKhTIMP [expansion unknown]

[Abstract] A study was made of the possibility of treating effluents from the production of alumina-silica catalyst at the Ufa petroleum refinery to separate suspended matter and oil products using coagulants and flocculants. Basic contaminants are sodium, ammonium and aluminum sulfates and nitrates, mechanical impurities and oil products. Mechanical impurities and oil products exceed the maximum permissible concentration for biological treatment by factors of 60 and 30, respectively, and the settling tank system does not meet requirements. Optimum results were achieved at pH 7.5-8 with 70-90 mg/liter of aluminum sulfate as coagulant and 0.6-0.8 mg/liter of polyacrylamide as flocculant. Figures 2; references 6: 5 Russian, 1 Western.  
[374-12765]

UDC 66.06

### LEACHING PHENOL FROM WASTE EFFLUENTS BY ADSORPTION

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84  
(manuscript received 18 Mar 83) pp 307-308

GOSPODINOVA, D.B., NIKOLOV, N.S. and KARAG'ZOVA, Institute for Petrochemistry and Petroleum Refining, Burgas, People's Republic of Bulgaria

[Abstract] A study of the possibility of leaching phenol from industrial waste effluent by using polymeric adsorption resins "Duolit ES-861" (France) and "Vofatit I-56" (GDR) shows that at an optimum hourly space velocity of 1.2, Duolit adsorbs 0.25 and Vofatit adsorbs 0.15 gram phenol per cm<sup>3</sup> of adsorbent. Sodium sulfate, also present in the effluent, has no effect on the adsorption process and passes on into the filtrate. The phenol may be fully recovered with acetone during the regeneration of the adsorbent. Figure 1; references 5: 2 Russian, 3 Western.  
[381-12765]

## LEACHING FLUORINE FROM SUBTERRANEAN WATER BY ELECTROCOAGULATION

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84 (manuscript received 8 Feb 83) pp 312-316

MATVEYEVICH, V.A., DRONDINA, R.V., ROMANOV, A.M. and NOVIKOV, G.I.,  
Institute of Applied Physics, MSSR Academy of Sciences, Kishinev

[Abstract] Defluorination of natural water containing 0.26-1.00 mole/m<sup>3</sup> of fluorine to potable levels may be achieved by an electrocoagulation technique with aluminum hydroxide obtained by electrolysis of metallic aluminum. Since this is a costly method both in aluminum consumption and electrical energy, a study was made of the relationship of aluminum consumption and degree of defluorination to pH, anionic composition, current density and initial fluoride content. The study shows that natural waters containing anion-passivators such as SO<sub>4</sub><sup>-2</sup> and HCO<sub>3</sub><sup>-</sup> passify the aluminum anode and reduce the anode dissolution rate. The presence of 0.25-1.00 mole/m<sup>3</sup> of fluorine has no practical effect on the rate of aluminum dissolution in the presence of 20-25% Cl<sup>-</sup>. Figures 2; references 20: 15 Russian, 5 Western.  
[381-12765]

## EFFECT OF MONTMORILLONITE ON SEPARATION OF MICROORGANISMS FROM WATER BY COAGULATION

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84 (manuscript received 10 Feb 83) pp 316-319

GLOBA, L. I. and NIKOVSKAYA, G.N., Institute of Colloid Chemistry and Chemistry of Water imeni A.V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] A study was made of the effect of adding clayey montmorillonite during water treatment by bulk coagulation with aluminum sulfate using T2 phage of E. coli B (coarse virus) and MS2 E. coli K = 12 (fine virus) as models. The results show that virus removal can be increased if finely-divided Cherkassy montmorillonite is added prior to the coagulation stage. Varying the initial content of microorganism in the water has little effect on the effectiveness of water treatment. Figures 4; references 14: 12 Russian, 2 Western.  
[381-12765]

# SORPTION OF RADIONUCLIDES FROM LIQUID EFFLUENTS OF NUCLEAR ELECTRIC POWER PLANTS ON OXIDIZED CHARCOALS AND ION EXCHANGE RESINS

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84  
(manuscript received 4 Feb 82) pp 319-321

KUL'SKIY, L.A., VOLOSHINOVA, A.M., BLIZNYUKOVA, V.A., SMIRNOVA, R.S. and KOL'CHENKO, V.A., Institute of Colloid Chemistry and Chemistry of Water imeni A.V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] The selectivity and high resistance to radiation of oxidized charcoals suggests they be used as radionuclide adsorbers to deactivate liquid effluent from nuclear electric power plants. A study was made of the sorption dynamics of  $Cs^{137}$ ,  $Sr^{90}$ ,  $Zr^{95}$ - $Nb^{95}$  and  $Ce^{144}$  from aqueous solutions with BAU and SKT oxidized charcoals and with KU-2 and KB-4 cation exchange resins for comparison. The results showed that KU-2 had the highest protection coefficient, while BAU and SKT had the lower. Monovalent cesium is weakly sorbed on BAU, while the distribution coefficient of  $Cs^{137}$  on KB-4 resin is 15 times greater than for BAU. The selectivity of the sorbents decreases in the order: for radionuclides  $Cs^{137}$  - - KU-2 > KB-4 > BAU; for  $Sr^{90}$  and  $Ce^{144}$  - KB-4 > KU-2 > BAU > KU-2. References 5 (Russian).  
[381-12765]

# INTENSIFICATION OF BIOCATALYTIC TREATMENT OF WASTE WATER BY ADSORPTION

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84 (manuscript received 28 Feb 83) pp 321-322

KOGANOVSKIY, A.M., UDOD, V.M., KIRICHENKO, V.A., BOYKO, T. YaN-V. and KONDRATOV, T.B., Institute of Colloid Chemistry and Chemistry of Water imeni A.V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] While biological treatment of sewage is one of the least costly methods, it requires 8-24 hours treatment time. Treatment by adsorption alone can be done in 0.2 - 1.0 hour, but many contaminants are weakly adsorbed and the adsorbents must be periodically regenerated, a costly process. In the present work biological oxidation and adsorption were combined into one process and compared with that of running each process separately, using n-hexanol, OS-20 and Prevocell as control contaminants and KAD, OU-A, AG-3 and AN-3 as adsorbents. The results show that biocatalytic treatment of sewage water may be intensified by a factor of 2. Adsorption and biodegradation prior to adsorption equilibrium proceed independently for substances readily adsorbed but that behave differently to microorganisms. Bioadsorption may thus be used to intensify sewage treatment at chemical and microbiological production enterprises. References 5 (Russian).  
[381-12765]

## FLOTATION PURIFICATION OF NATURAL AND WASTE WATERS FROM DDT

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84 (manuscript received 31 Jan 83) pp 337-339

SKRYLEV, L.D., NEVINSKIY, A.G. and PURICH, A.N., Odessa State University imeni I.I. Mechnikov

[Abstract] A study was made of the possibility of using a non-reagent method to treat Dnestr River and Gulf of Odessa waters contaminated with DDT of 0.5 - 5 mc particle size. The water was treated by three methods, viz., impeller flotation, pressurized flotation and pneumatic flotation. Most complete (97%) separation of DDT occurs at pH 4 where the DDT particles have minimum positive charge. As the pH is either raised or lowered and the particles acquire more negative or positive charge, the efficiency of the process decreases. Sintanol DS-10 stabilizer proved to be optimal, while raising the temperature inhibits particle fixation on the air bubbles thus lowering the degree of DDT separation. Figures 3; references 12: 10 Russian, 2 Western.  
[381-12765]

UDC 628.033;162.8;541.43

## TREATING SEWAGE WATERS FROM WAREHOUSES AND DEPOTS STORING CHEMICALS FOR PLANT PROTECTION

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 6, No 4, Jul-Aug 84 (manuscript received 27 Dec 82) pp 351-354

SHEVCHENKO, M.A., MARCHENKO, P.V., TARAN, P.N., MARCHENKO, V.M., VAKULENKO, V.F., RAK, L.V. and LIZUNOV, V.V., Institute of Colloid Chemistry and Chemistry of Water imeni A.V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] Sewage from warehouses and depots storing pesticides in the "Sel' khozhimiya" Production Association is currently treated either with lime and alkali, or thermally in a cyclone reactor flaring into the atmosphere. The first method does not always provide full decontamination and results in salt accumulation in the soil, while the second method is costly and pollutes the air. In neither method can the water be re-cycled. A complex, effluent-free method is proposed that is based on chemical destruction of the biologically-active component of the pesticide and its separation by adsorption. A flow-diagram includes a preliminary 48-hour settling stage for hydrolysis, partial oxidation and coagulation of impurities. The clarified water is then treated with ozone and, after filtration, it may be used for other needs of the treatment plant. Figure 1; references 8: 6 Russian, 2 Western.  
[381-12765]

## ENERGY EXPENDITURE IN WATER DESALINATION TECHNOLOGICAL PROCESSES

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 8, Aug 84 pp 6-9

KOLODIN, M. V., candidate of technical sciences, Institute of Deserts, TuSSR Academy of Sciences

[Abstract] The technology of water desalination is being expanded by leaps and bounds, doubling its capacity every 3-4 years. The economics of water desalination depends largely on consumption of energy regardless of which of the three principal methods is being used: thermal, mechanical or electric. A new concept of the universal index was introduced permitting across-the-board comparison of energy consumption in the above methods -- coefficient of energy effectiveness (CEE) -- representing production of fresh water per 1 MJ of consumed energy. The old coefficient of productivity (CP) relates to the new CEE as follows:  $CP = 0.43 CEE$ . Effectiveness of the principal desalination methods is discussed, favoring somewhat the hybrid approach in which a combination of the principal methods would be used. Overall, the impression is left that current efforts will lead to lower energy consumption in water desalination processes and, in turn, this will lead to wider application of desalination in assuring adequate water supplies, protection of water reservoirs from pollution and even to wider agricultural use of water in irrigation processes. Figures 5; references 9: 5 Russian, 4 Western.  
[377-7813]

UDC 628.387

## PURIFICATION OF EFFLUENT AT METAL PRODUCTS PLANT

Moscow VODOSNABZHENIYE I SANITARNAYA TEKHNIKA in Russian No 8, Aug 84 pp 28-29

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[Abstract] Effluents at plants processing various metal products contain excessive levels of zinc, trivalent chromium, lead and iron. An effective two-stage method was developed for removal of these problematic impurities. During the first stage these impurities are precipitated with 10% calcium hydroxide suspension at pH 8.5-9.0, followed by a second stage treatment with 10% solution of sodium hydrophosphate at pH 7.2-7.8. This treatment eliminated iron, copper, trivalent chromium and lead totally from the effluent and reduced zinc content to 0.93 mg/l, well within the established standards. This method was evaluated in field tests at the "Radiator" plant in Orenburg Oblast with excellent results. The water purified by this system could be used to supply steam boilers after preliminary reduction of its hardness to 0.01-0.02 mg-eq/l by passage through available Na cation exchange filters. Figure 1; references 4 (Russian).  
[377-7813]

UDC: 547.724.1:630.86.002.8

PROSPECTS FOR USE OF CELLULOSE-PAPER INDUSTRY WASTES IN PRODUCTION OF FURFURAL

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, May-Jun 84 pp 8-9

TRAVINA, K. A., SHVETSOVA, I. B., USKOV, Yu. N. and STEPANENKO, O. N.

[Abstract] Tests were performed at Leningrad Hydrolysis Plant in a 25 liter hydrolysis apparatus to study the possibility of using wood bark wastes for the production of furfural. Pressure in the hydrolytic apparatus was 6.09 MPa, furfural distillation time 90 minutes, furfural vapor take-off modulus 2.0 times absolutely dry raw material. Acid-free batches and batches using 10% sulfuric acid were tested. Based on the successful results of the studies, no order has been issued for development and manufacture of a continuous flow installation for production of furfural from cellulose-paper industry wastes and wood chip wastes with a capacity of 4 tons of dry raw material per hour. A schematic diagram of the installation is presented. Figure 1; references 3 (Russian).  
[336-6508]

MISCELLANEOUS

UDC: 543.8

STUDY OF ENERGETICS AND MECHANISM OF SONOCHEMICAL REACTIONS. HYDROGEN/HYDROGEN PEROXIDE YIELD RATIO IN VARIOUS AQUEOUS SYSTEMS

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 58, No 6, Jun 84 (manuscript received 29 Oct 82) pp 1402-1405

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[Abstract] This work determined the initial rates of formation of molecular hydrogen and hydrogen peroxide in atmospheres of argon, nitrogen, air, oxygen and an artificial  $N_2+O_2$  mixture. The rate of formation of hydrogen peroxide in a hydrogen atmosphere was determined to be finite though very small. The experimentally-determined rate of formation of  $H_2O_2$  in an atmosphere of  $H_2$  was  $3 \cdot 10^{-8}$  mol/l·min--40 times less than in an atmosphere of nitrogen. The rate apparently varies directly with intensity of ultrasound. Figure 1; references 20: 13 Russian, 7 Western.  
[324-6508]

CSO: 1841

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